ORDER NO. KMF0311730C2

Service Manual

Compact Plain Paper FAX with Digital Answering System

KX-FP145G
(for Germany)

⚠ WARNING

This service information is designed for experienced repair technicians only and is not designed for use by the general public.
It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product.
Products powered by electricity should be serviced or repaired only by experienced professional technicians. Any attempt to service or repair the product or products dealt with in this service information by anyone else could result in serious injury or death.

When you note the serial number, write down all of the 11 digits. The serial number may be found on the bottom of the unit.

Panasonic

IMPORTANT INFORMATION ABOUT LEAD FREE, (PbF), SOLDERING

If lead free solder was used in the manufacture of this product the printed circuit boards will be marked PbF.
Standard leaded, (Pb), solder can be used as usual on boards without the PbF mark. When this mark does appear please read and follow the special instructions described in this manual on the use of PbF and how it might be permissible to use Pb solder during service and repair work.

1. INTRODUCTION

1.1. TRANSLATION LISTS

1.1.1. LCD MESSAGE

ENGLISH	GERMAN
BASIC SETTINGS	Grundeinstell.
FEATURE LIST	Einst. Liste
DIRECTORY	Telefonbuch
TAD OPERATION	Anrufbeantworter
FAX RECEIVING	Faxempfangen
COPIER	Kopieren
REPORTS	Listen drucken
CALLER ID	Anrufer-ID
CALL SERVICE	SERVICE ANRUFEN
CALL SERVICE 2	SERVICE 2 ANRUFEN
CHECK DOCUMENT	Dokument prüfen
CHECK FILM	Film prüfen!
CHECK MEMORY	Speicher prüfen
CHECK PAPER	Papier prüfen!
CLOSE	Schliessen
TENSION PLATE	Spannleist e
COVER OPEN	Klappe offen!
DIRECTORY FULL	Telefonbuch voll
FAX IN MEMORY	Fax im Speicher
FILM EMPTY	Filmröhre
FILM NEAR EMPTY	Nähe Filmende
MEMORY FULL	Speicher voll!
MESSAGE FULL	Spr. voll
MODEM ERROR	Modemfehler
NO FAX REPLY	Kein Faxantw.
NO TAD GREETING	Kein Ansage
OPEN CABINET	Gehäuse Öffnen
CHECK FILM SLACK	Prüfen Filmspann.
CHECK FILM TYPE	Filmtyp Prüfen
PAPER JAMMED	Papierstau
PLEASE WAIT	Bitte warten
POLLING ERROR	Abruf-Fehler
RECEIVE ERROR	Empf.-Fehler
REDIAL TIME OUT	Wahlwiederholung
REMOVE DOCUMENT	Stau beseitigen

TRANSMIT ERROR	Ü	b	e	r	t	r	.	-	F	e	h	l	e	r		
UNIT OVERHEATED	T	h	e	r	m	o	k	o	p	f		h	e	i	ß	
SYSTEM SETUP	V	o	r	b	e	r	e	i	t	u	n	g				
PRESS NAVI.[←→]	D	r	ü	c	k	e	n		S	i	e		[	←	→	]
YOUR LOGO	E	i	g	e	n	e	s		L	o	g	o				
PRESS SET		<	S	T	A	R	T	>		d	r	ü	c	k	e	n

1.1.2. ERROR CODE TABLE

ENGLISH	GERMAN
COMMUNICATION ERROR	Kommunikationsfehler
DOCUMENT JAMMED	Dokument gestaut
ERROR-NOT YOUR UNIT	Fehler-Gegenstelle
JUNK FAX PROH. REJECT	Junk Fax verh. Abgelehnt
MEMORY FULL	Speicher voll
NO DOCUMENT	Kein Dokument
OTHER FAX NOT RESPONDING	Gegenstelle antwortet nicht
PRESSED THE STOP KEY	Stop-Taste gedrückt
OK	OK

1.2. ABOUT LEAD FREE SOLDER (PbF: Pb free)

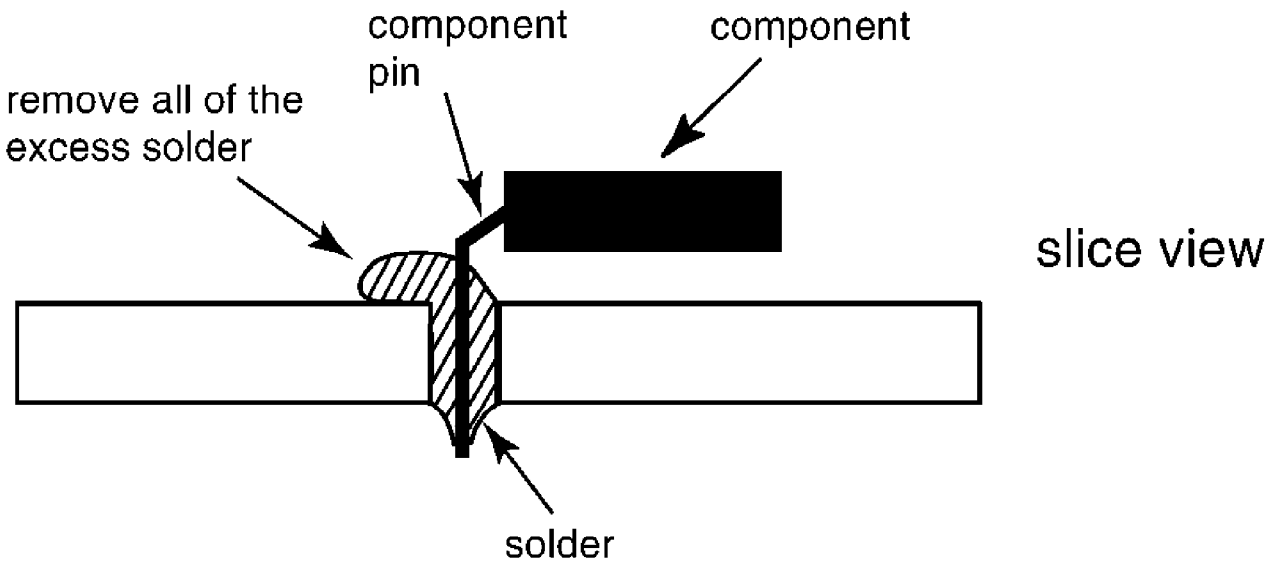
Note:
In the information below, Pb, the symbol for lead in the periodic table of elements, will refer to standard solder or solder that contains lead.
We will use PbF solder when discussing the lead free solder used in our manufacturing process which is made from Tin, (Sn), Silver, (Ag), and Copper, (Cu). This model, and others like it, manufactured using lead free solder will have PbF stamped on the PCB. For service and repair work we suggest using the same type of solder although, with some precautions, standard Pb solder can also be used.

Caution

- **PbF solder has a melting point that is 50° ~ 70° F, (30° ~ 40°C) higher than Pb solder. Please use a soldering iron with temperature control and adjust it to 700° ± 20° F, (370° ± 10°C). In case of using high temperature soldering iron, please be**

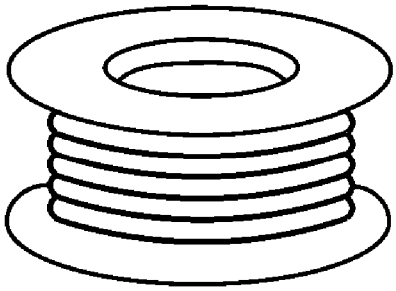
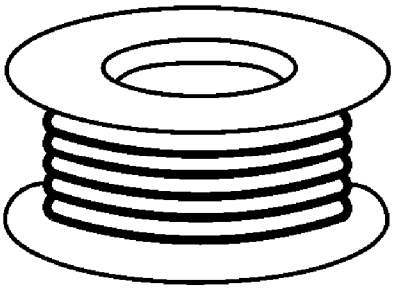
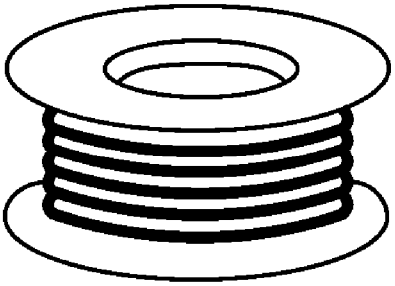
careful not to heat too long.

- PbF solder will tend to splash if it is heated much higher than its melting point, approximately 1100°F, (600°C).
- If you must use Pb solder on a PCB manufactured using PbF solder, remove as much of the original PbF solder as possible and be sure that any remaining is melted prior to applying the Pb solder.
- When applying PbF solder to double layered boards, please check the component side for excess which may flow onto the opposite side (See figure, below).



1.2.1. SUGGESTED PBF SOLDER

There are several types of PbF solder available commercially. While this product is manufactured using Tin, Silver, and Copper,
(Sn+Ag+Cu), you can also use Tin and Copper, (Sn+Cu), or Tin, Zinc, and Bismuth, (Sn+Zn+Bi). Please check the manufac-
turer's specific instructions for the melting points of their products and any precautions for using their product with other
materials.
The following lead free (PbF) solder wire sizes are recommended for service of this product: 0.3mm, 0.6mm and 1.0mm.

0.3mm X 100g	0.6mm X 100g	1.0mm X 100g
		

1.3. HOW TO RECOGNISE THAT Pb FREE SOLDER IS USED

P.C.Boards marked as “PbF” use Pb Free solder. (See the figure below.)
Pb Free is not used the Power Supply Board of this unit.
(Example :Digital board)

Note : The “PbF” marked may be found on different areas of the same P.C.Board,depending on manufacture date.

1.4. SAFETY PRECAUTIONS

1. **Before servicing, unplug the AC power cord to prevent an electric shock.**
2. **When replacing parts, use only the manufacturer's recommended components.**
3. **Check the condition of the power cord. Replace if wear or damage is evident.**
4. **After servicing, be sure to restore the lead dress, insulation barriers, insulation papers, shields, etc.**
5. **Before returning the serviced equipment to the customer, be sure to perform the following insulation resistance test to prevent the customer from being exposed to shock hazards.**

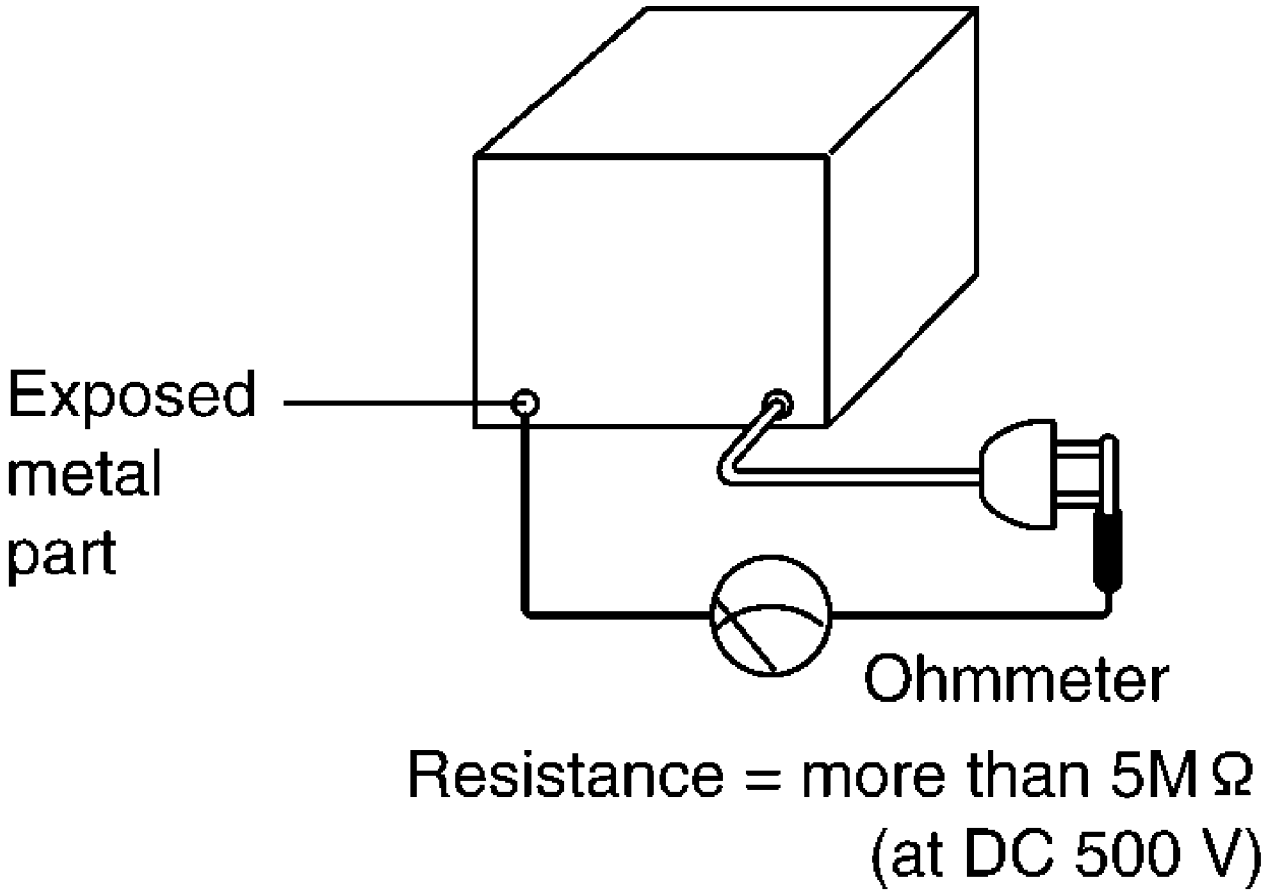
1.5. INSULATION RESISTANCE TEST

1. **Unplug the power cord and short the two prongs of the plug with a jumper wire.**

2. Turn on the power switch.

3. Measure the resistance value with an ohmmeter between the jumpered AC plug and each exposed metal cabinet part (screw heads, control shafts, bottom frame, etc.).
Note: Some exposed parts may be isolated from the chassis by design. These will read infinity.

4. If the measurement is outside the specified limits, there is a possibility of a shock hazard.



1.6. FOR SERVICE TECHNICIANS

ICs and LSIs are vulnerable to static electricity.
When repairing, the following precautions will help prevent recurring malfunctions.

1. Cover the plastic part's boxes with aluminum foil.

2. Ground the soldering irons.

3. Use a conductive mat on the worktable.

4. Do not touch the IC or LSI pins with bare fingers.

1.7. BATTERY CAUTION

CAUTION

Danger of explosion if the battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's Instructions.
The lithium battery is a critical component (type No. CR2032). Please observe for the proper polarity and the exact location when replacing it and soldering the replacement lithium battery in.

1.8. AC CAUTION

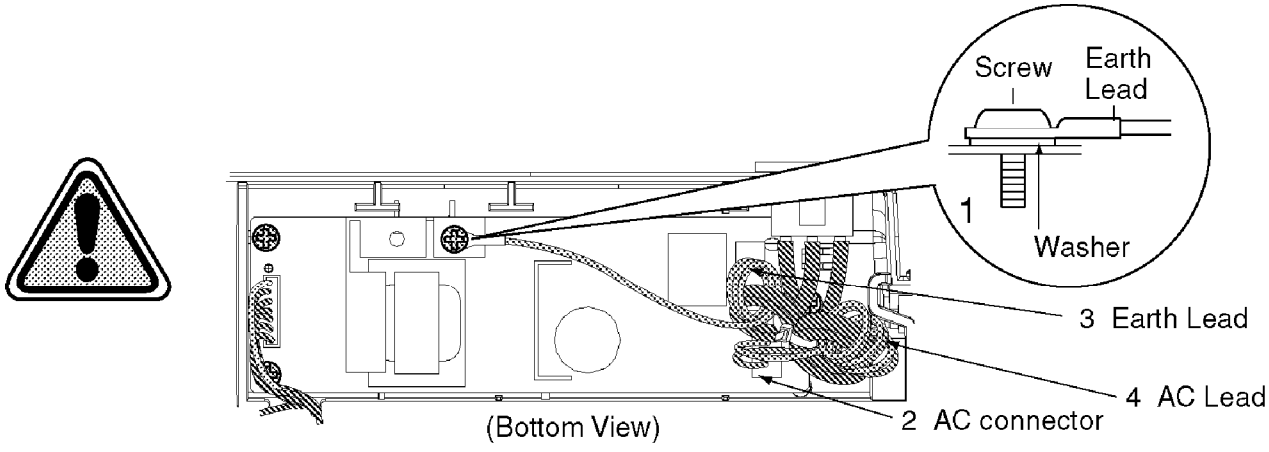
For safety, before closing the lower cabinet, please make sure of the following precautions.

1. The earth lead is fixed with the screw.

2. The AC connector is connected properly.

3. Wrap the earth lead around the core 3 times.

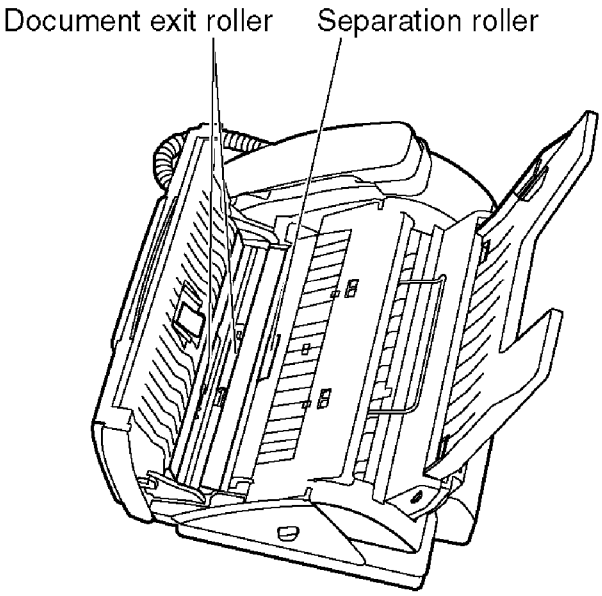
4. Wrap the AC lead around the core 3 times.

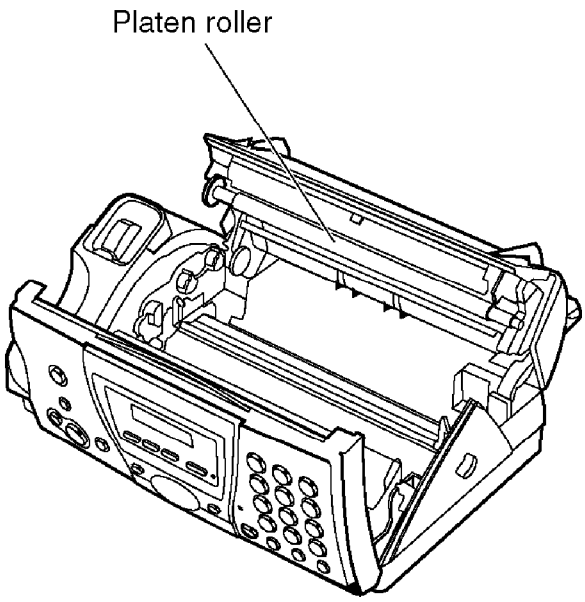


1.9. PERSONAL SAFETY PRECAUTIONS

1.9.1. MOVING SECTIONS OF THE UNIT

Be careful not to let your hair, clothes, fingers, accessories, etc., become caught in any moving sections of the unit.
The moving sections of the unit are the rollers and a gear. There is a separation roller and a document feed roller which are rotated by the document feed motor. A gear rotates the two rollers. Be careful not to touch them with your hands, especially when the unit is operating.



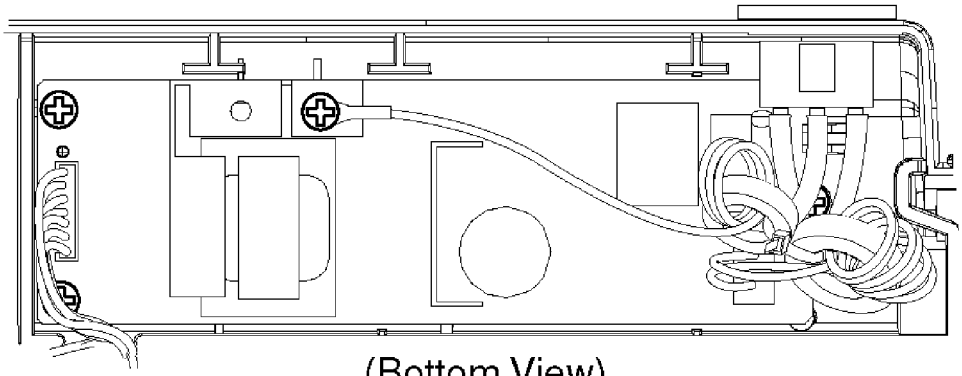


1.9.2. LIVE ELECTRICAL SECTIONS

All the electrical sections of the unit supplied with AC power by the AC power cord are live.
Never disassemble the unit for service with the AC power supply plugged in.

CAUTION:

AC voltage is supplied to the primary side of the power supply unit. Therefore, always unplug the AC power cord before disassembling for service.

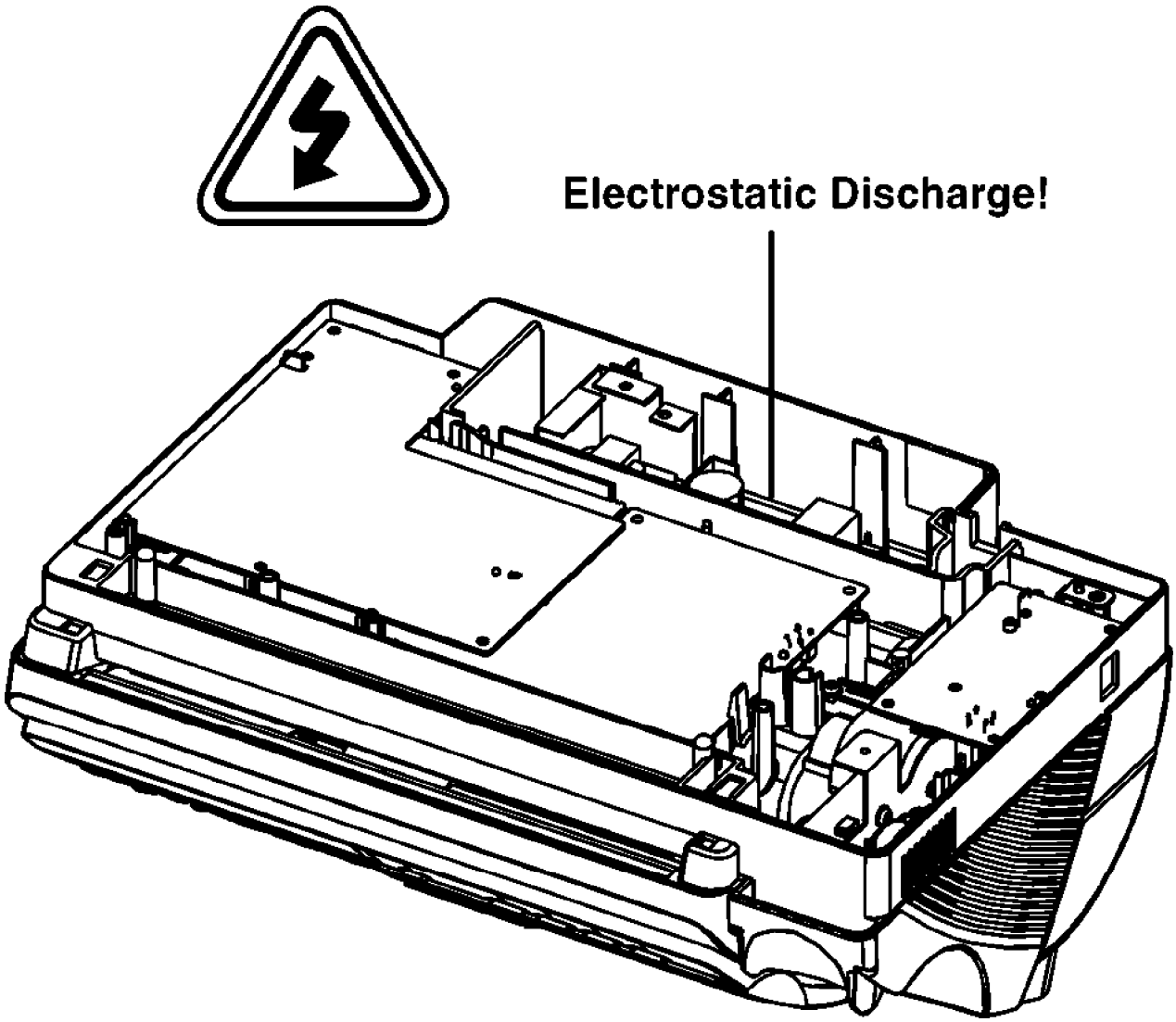


(Bottom View)

1.10. SERVICE PRECAUTIONS

1.10.1. PRECAUTIONS TO PREVENT DAMAGE FROM STATIC ELECTRICITY

Electrical charges accumulate on a person. For instance, clothes rubbing together can damage electric elements or change their electrical characteristics. In order to prevent static electricity, touch a metallic part that is grounded to release the static electricity. Never touch the electrical sections such as the power supply unit, etc.



2. FEATURES AND SPECIFICATIONS

2.1. FEATURES

General

- **Help function**

  Please refer to WHEN YOU DON'T KNOW HOW TO OPERATE THE UNIT, USE THE HELP FUNCTION.(

) to print below features.

  Display:

1. **BASIC SETTINGS**
2. **FEATURE LIST**
3. **DIRECTORY**
4. **TAD OPERATION**
5. **FAX RECEIVING**
6. **COPIER**
7. **REPORTS**
8. **CALLER ID**

- **LCD (Liquid Crystal Display) readout**

Plain Paper Facsimile Machine

- **8 second transmission speed ***
- **A4, G3 compatible**
- **Automatic document feeder (10 sheets)**
- **Fax pager call**
- **Quick scan**
- **Resolution: Standard/Fine/Super fine/Photo (64 level)**
- **Broad cast with NAVIGATOR**
- **50-sheet paper capacity (20 lb.)**
- **Automatic fax/phone switching**

*** The 8 second speed is based upon the ITU-T No. 1 Test Chart on the condition that memory transmission is performed.**

Large Memory (28 pages)... Performed by DRAM
Approx. 28 pages of memory reception
Approx. 25 pages of memory transmission

Integrated Telephone System

- **On-hook dialing**
- **Digital Duplex Speakerphone**
- **Voice muting**

- **Redialing function**
- **100-Station telephone directory with NAVIGATOR**
- **Caller ID compatible****

  ****Feature requires a subscription to caller identification services offered by certain local telephone companies for a tee. You and your caller(s) must be in areas that provide caller identification services, and compatible equipment must be used by both telephone companies. Feature not available when the unit is connected to a PBX system.**

Enhanced Copier Function

- **Multi-copy function (up to 30 copies)**
- **Enlargement and reduction**
- **Collate**
- **64-Level halftone**

Digital Answering System

- **Voice Time/Day Stamp**
- **18-Minutes recording time**
- **Voice and fax pager call**

2.2. SPECIFICATIONS

Applicable Lines:

Public Switched Telephone Network

Document Size:

Max. 216 mm in width
Max. 600 mm in length

Effective Scanning Width:

208 mm

Recording Paper Size:

A4: 210 × 297 mm

Effective Printing Width:

202 mm

Transmission Time*:

Approx. 8 s/page (ECM-MMR)**

Scanning Density:

Horizontal:

8 pels/mm (203 pels/inch)

Vertical:

3.85 lines/mm (98 lines/inch)—STANDARD mode

7.7 lines/mm (196 lines/inch)—FINE/PHOTO mode

15.4 lines/mm (392 lines/inch)—SUPER FINE Mode

Halftone Level:

64-level

Scanner Type:

Contact Image Sensor (CIS)

Printer Type:

Thermal Transfer on Plain Paper

Data Compression System:

Modified Huffman (MH), Modified READ (MR), Modified Modified READ (MMR)

Modem Speed:

14,400/12,000/9,600/7,200/4,800/2,400 bps; Automatic Fallback

Operating Environment:

5—35°C (41—95°F), 20—80% RH (Relative Humidity)

Dimensions (H×W×D):

Approx. height 139 mm × width 331 mm × depth 238 mm

Mass (Weight):

Approx. 3.0 kg

Power Consumption:

Standby: Approx. 4.2 W

Transmission: Approx. 15 W

Reception: Approx. 35 W (When receiving a 20% black document)

Copy: Approx. 40 W (When copying a 20% black document)

Maximum: Approx. 130 W (When copying a 100% black document)

Power Supply:

220-240 V AC, 50 Hz

Fax Memory Capacity:

Voice memory:

Approx. 18 minutes of recording time including greeting message***

Fax memory:

Approx. 28 pages memory reception

Approx. 25 pages memory transmission

(Based on ITU-T No. 1 Test Chart in standard resolution without using the Error Correction Mode.)

*** Transmission speed depends upon the contents of the pages, resolution, telephone line conditions and capability of the other party's machine.**

****Transmission speed mentioned here is based upon the ITU-T No1 Test Chart. If the capability of the other party's machine is inferior to your unit, the transmission time may be longer.**

*****Recording time may be reduced by the calling party's background noise.**

Note:

- **Any details given in these instructions are subject to change without notice.**
- **The pictures and illustrations in these instructions may vary slightly from the actual product.**

Design and specifications are subject to change without notice.

2.3. OPTIONAL ACCESSORIES

- **For best results, use genuine Panasonic replacement film Model No. KX-FA54X.**

Model No.	Item	Specifications/Usage
KX-FA54X	Replacement Film	2 rolls-216 mm × 35 m (prints about 105 A4-sized pages)

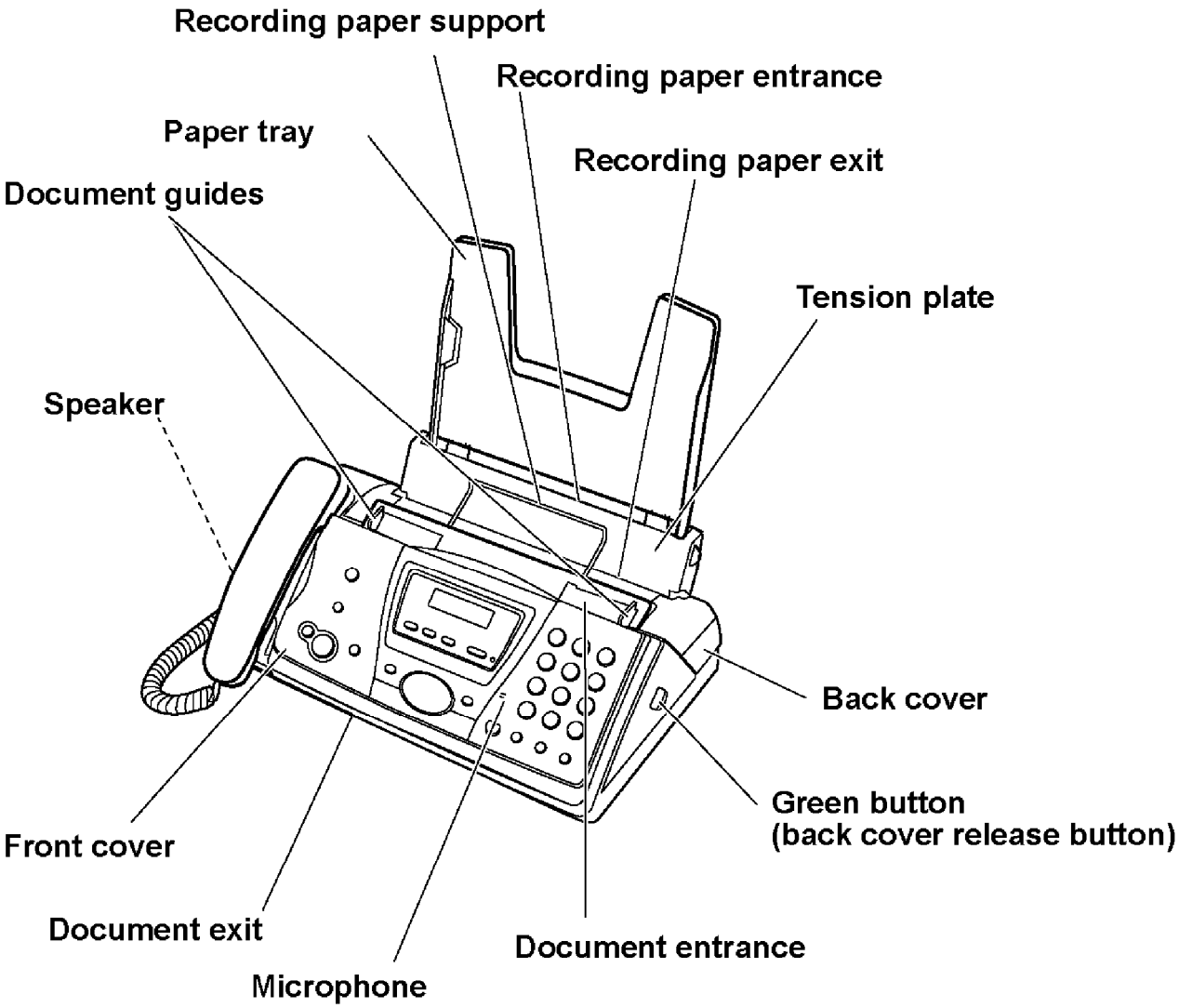
Note:

The ink film is not reusable. Do not rewind and use the ink film again.

3. INSTALLATION

3.1. LOCATION OF CONTROLS

3.1.1. OVERVIEW



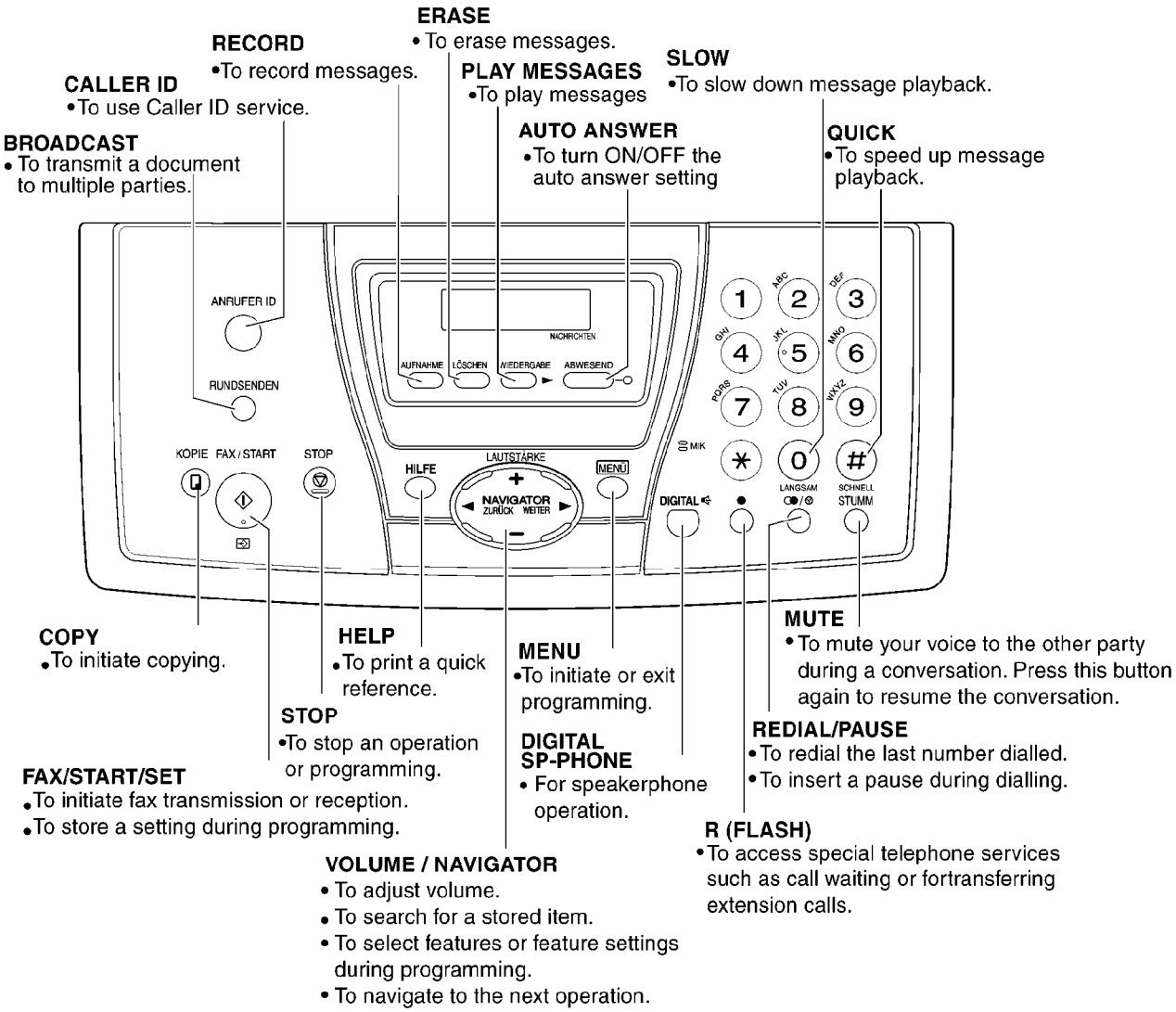
Note:

- **The document will be ejected from the front of the unit. Install the unit on a desk or floor with a smooth surface and do not place anything in front of the unit.**

Speakerphone operation

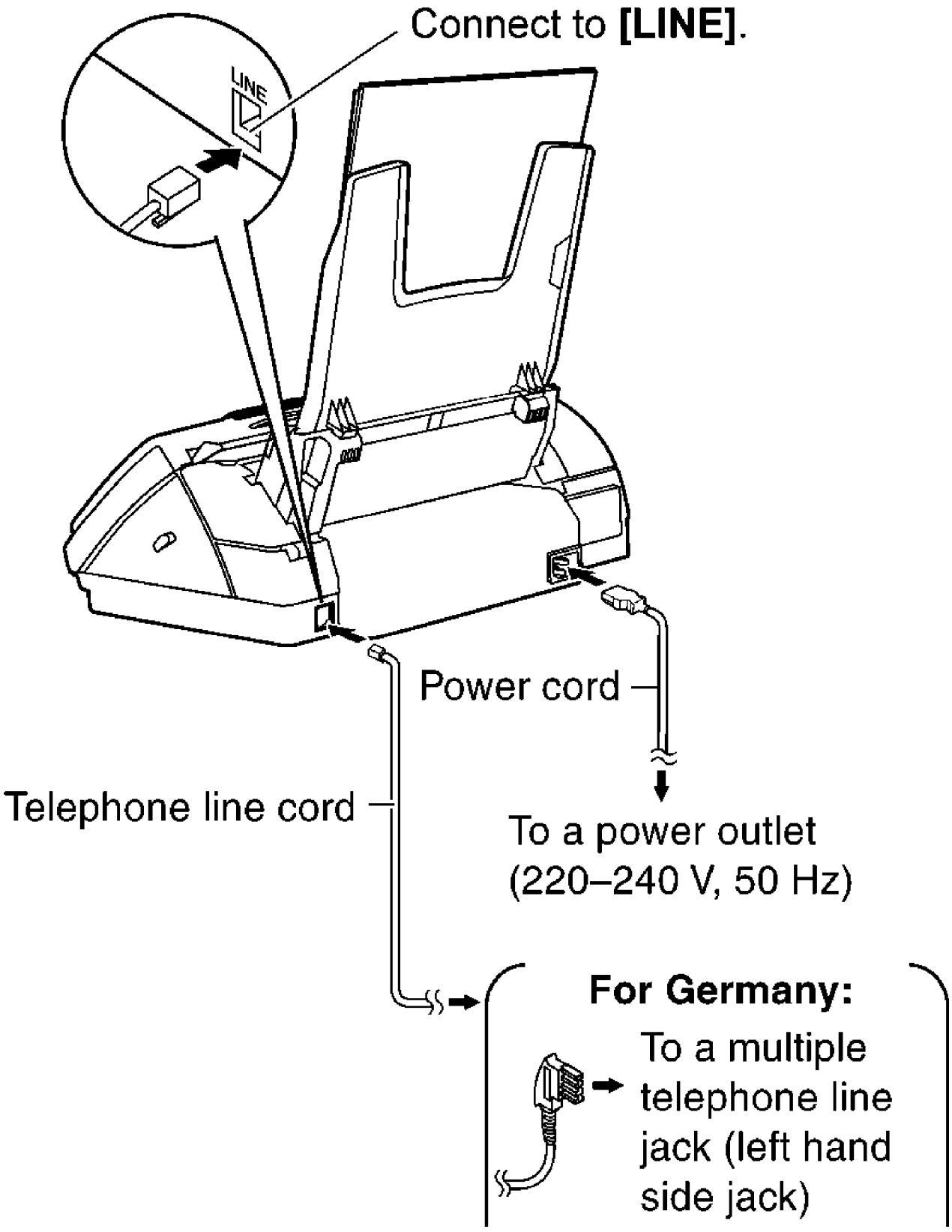
- **Use the speakerphone in a quiet room.**
- **Adjust the speakerphone volume using + or −.**
- **To switch to the handset, lift the handset. To switch back to the speakerphone, press DIGITAL SP-PHONE.**

3.1.2. CONTROL PANEL

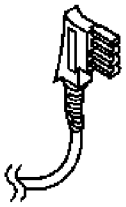


*** If the line is busy when you make a phone call using the DIGITAL SP-PHONE button, the unit will automatically redial the number up to 5 times.**

3.2. CONNECTIONS


Connect to [LINE].
LINE
Power cord
Telephone line cord
To a power outlet
(220–240 V, 50 Hz)
For Germany:
To a multiple telephone line jack (left hand side jack)

For Austria:



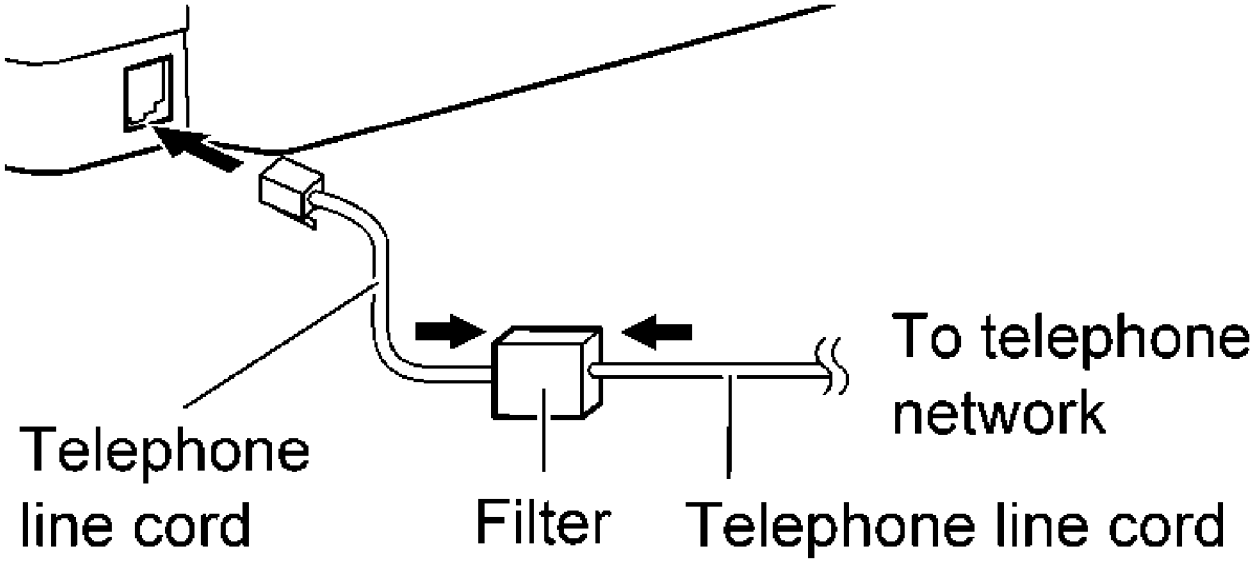
→ To a multiple telephone line jack marked "△" (KX-FP141) or "○" (KX-FP145)

Caution:

- **The mains lead must remain connected at all times.**
- **Never install telephone wiring during a lightning storm.**
- **When you operate this product, the power outlet should be near the product and easily accessible.**
- **Be sure to use the telephone line cord included in this unit.**
- **Do not extend the telephone line cord.**

Note:

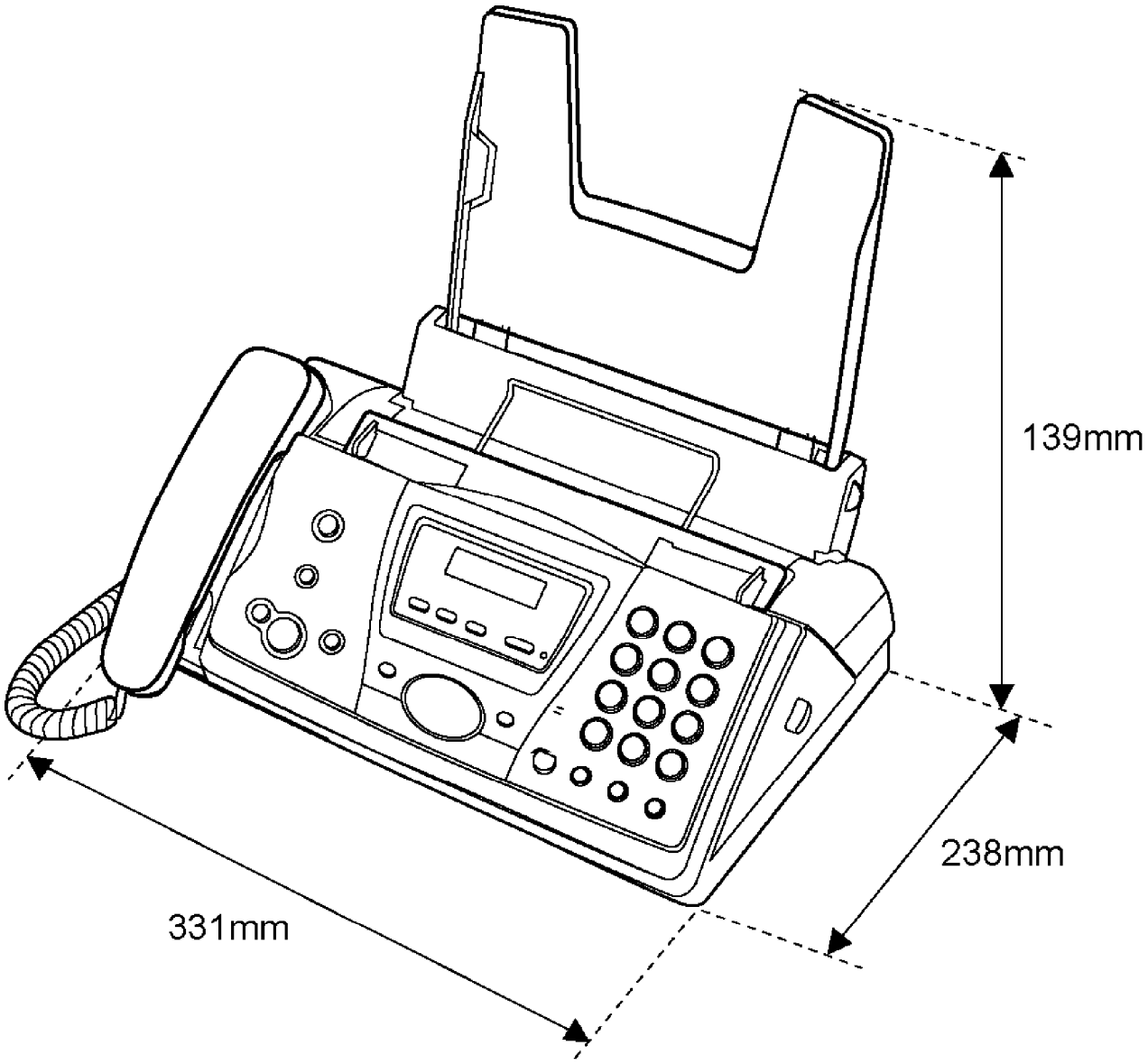
- **If any other device is connected on the same line, this unit may disturb the network condition of the device.**
- **Do not connect an answering machine to the same telephone line. If connected, set the automatic answer feature to OFF by pressing [AUTO ANSWER] repeatedly.**
- **If you use the unit with a computer and your internet provider instructs you to install a filter, please connect it as follows.**



3.3. INSTALLATION

3.3.1. INSTALLATION SPACE

The space required to install the unit is shown below.
The dimensions given are necessary for the unit to operate efficiently.



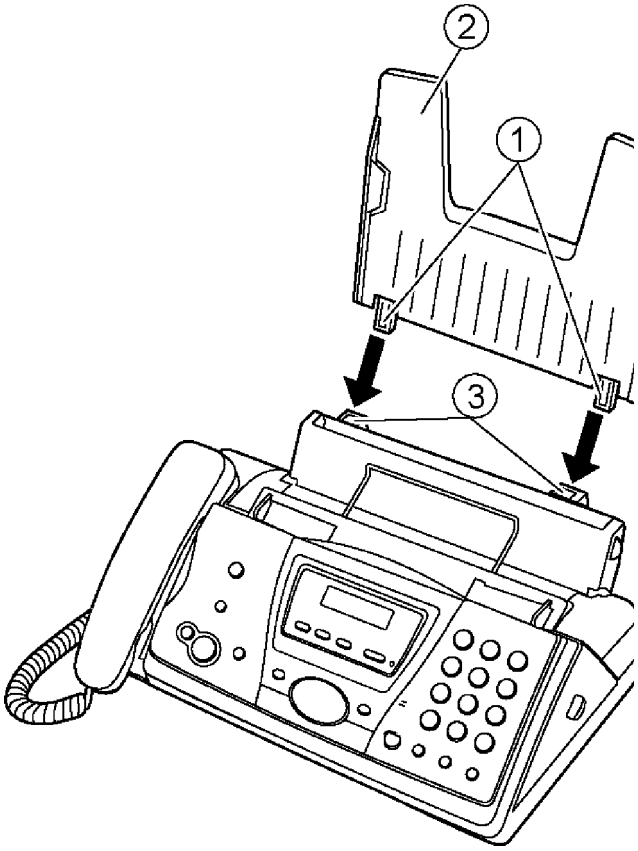
Note:

- **Avoid excessive heat or humidity.**
- **Use the unit within the following ranges of temperature and humidity.**
- **Ambient temperature: 5°C to 35°C**
- **Relative humidity: 20% to 80% (without condensation)**
- **Power cord length should be less than 5 meters (16.4 feet). Using a longer cord may reduce the voltage or cause malfunctions.**

- **Avoid direct sunlight.**
- **Do not install near devices which contain magnets or generate magnetic fields.**
- **Do not subject the unit to strong physical shock or vibration.**
- **Keep the unit clean. Dust accumulation can prevent the unit from functioning properly.**
- **To protect the unit from damage, hold both sides when you move it.**

3.3.2. INSTALLING THE PAPER TRAY

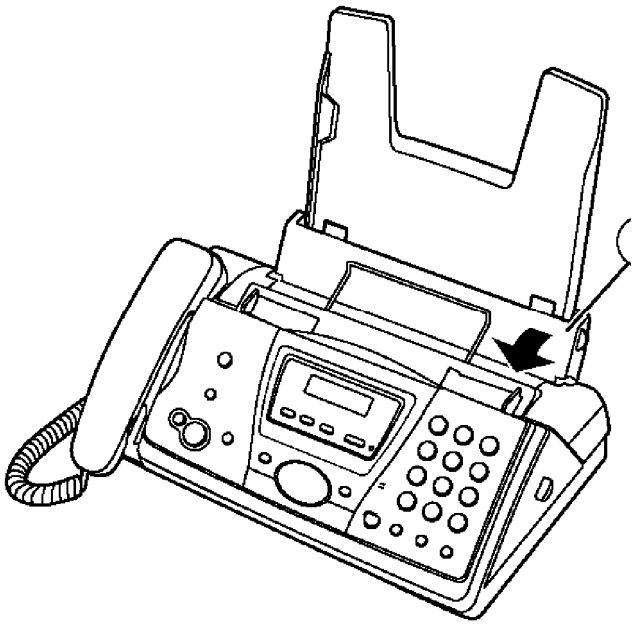
nsert the tabs (①) on the paper tray (②) into the lots on the back of the unit (③).



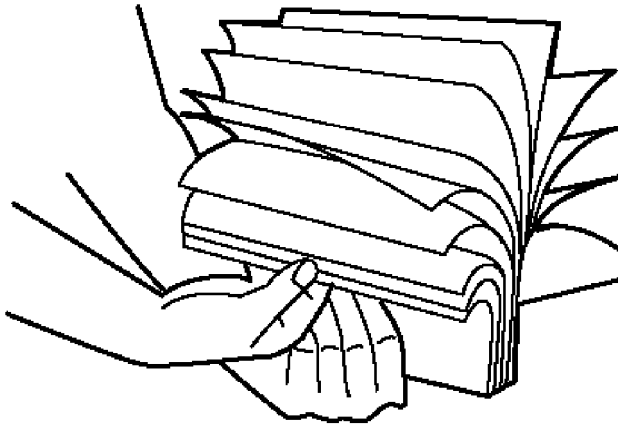
3.3.3. INSTALLING THE RECORDING PAPER

The unit can hold up to 30 sheets of 80 g/m² paper.

. **Pull the tension plate forward (①).**

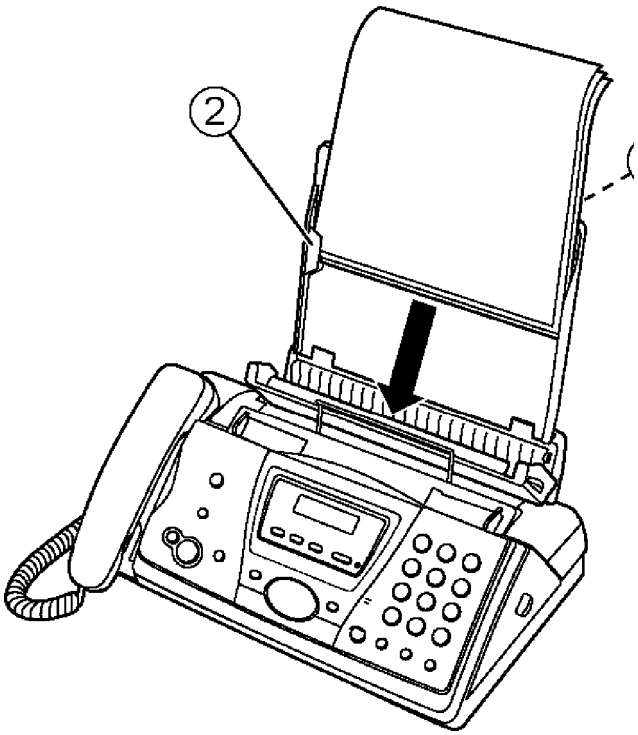


. **Fan the paper to prevent paper jams.**

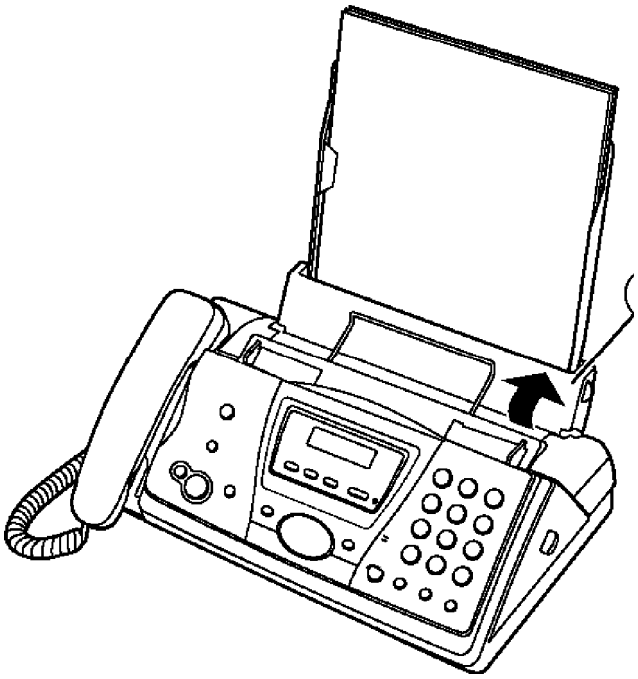


. Insert the paper, print-side down (①).

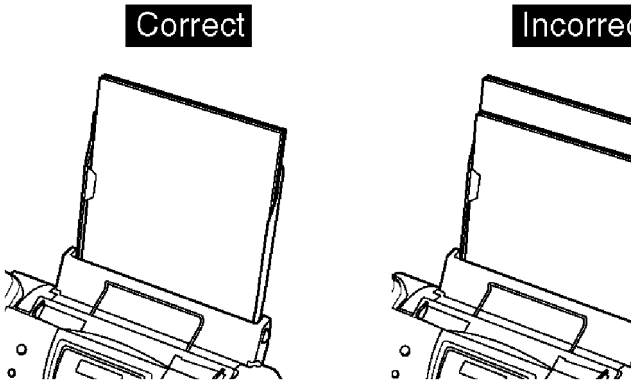
·The paper should not be over the tab (②).



. Push the tension plate back (①).



·If the paper is not inserted correctly, readjust the paper, or the paper may am.



Note:

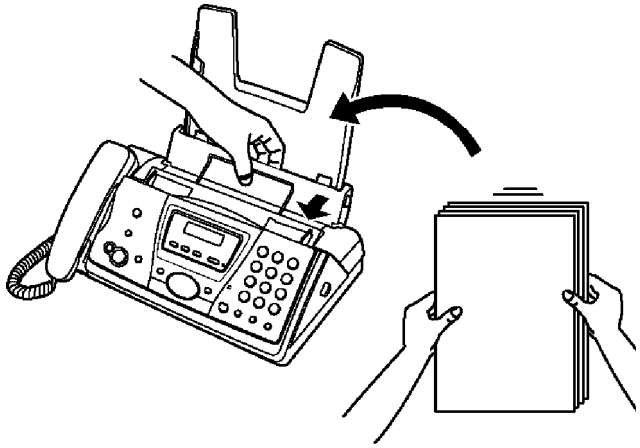
- Do not use the following types of paper:
- Paper with a cotton and/or fibre content that is over 20%, such as letterhead paper or paper used for resumes.
- Extremely smooth or shiny paper, or paper that is highly textured.
- Coated, damaged or wrinkled paper.
- Paper with irregularities, such as tabs or staples.
- Paper which has dust, lint, or oil stains.
- Paper that will melt, vaporize, discolour, scorch or emit dangerous fumes, near 200°C, such as vellum paper. These materials may transfer onto the fusing roller and cause damage.
- Moist paper
- Some paper only accepts print on one side. Try using the other side of the paper if you are not happy with the print quality or if misfeeding occurs.
- For proper feeding and best print quality, we recommend using long-grained paper.
- Do not use paper of different types or thickness at the same time. This may cause a paper jam.
- Avoid double-sided printing.
- Do not use paper printed from this unit for double-sided printing with other

copiers or printers. This may cause a paper jam.

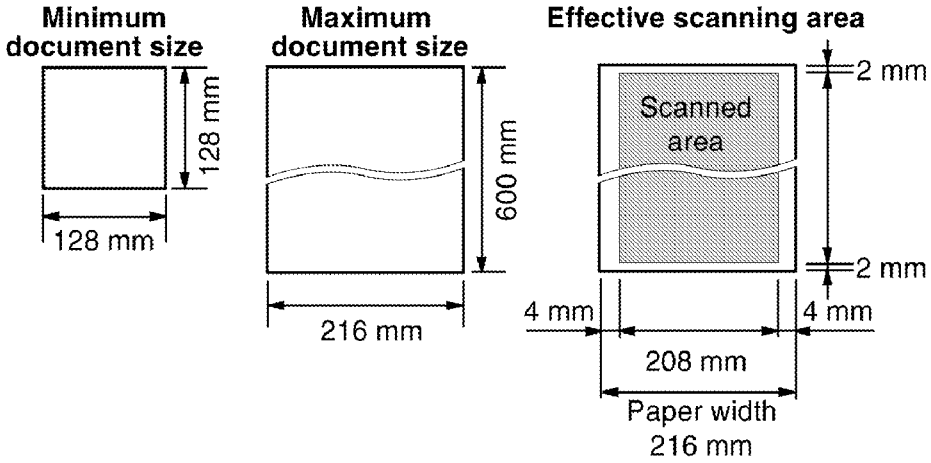
- To avoid curling, do not open paper packs until you are ready to use the paper. Store unused paper in the original packaging, in a cool and dry location.

3.3.4. ADDING PAPER TO THE PAPER TRAY

1. Pull the tension plate forward and hold open while removing all of the installed paper.
2. Add paper to the stack of paper you removed and straighten.
3. Fan the stack of paper.
4. Pull the tension plate forward and hold open while inserting the paper.



3.3.5. DOCUMENTS THE UNIT CAN FEED



Document weight

Single sheet:
45 g/m² to 90 g/m²
(12 lb. to 24 lb.)

Multiple sheets:
60 g/m² to 80 g/m²
(16 lb. to 20 lb.)

Note:

- Remove clips, staples or other similar fasteners.
- Check that ink, paste or correction fluid has dried.
- Do not send the following types of documents. (Use copies for fax transmission.)

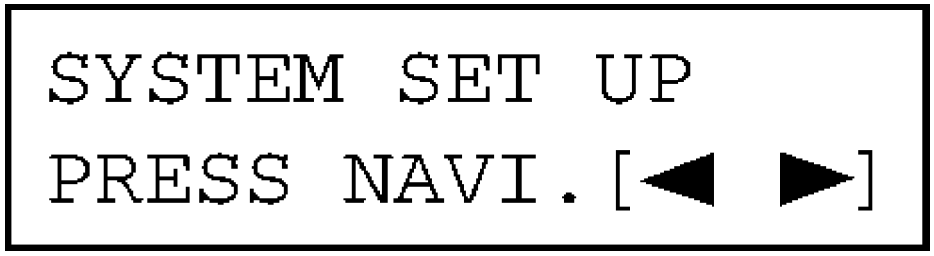
— Chemically treated paper such as carbon or carbonless duplicating paper
— Electrostatically charged paper
— Badly curled, creased or torn paper
— Paper with a coated surface
— Paper with a faint image
— Paper with printing on the opposite side that can be seen through the front (e.q. newspaper)

- **To transmit the document(s) with a width of less than A4 size (210 mm), we recommend using a copy machine to copy the original document onto A4 or letter -sized paper, then transmit the copied document.**

3.3.6. SETTING YOUR LOGO

The logo can be your company, division or name.

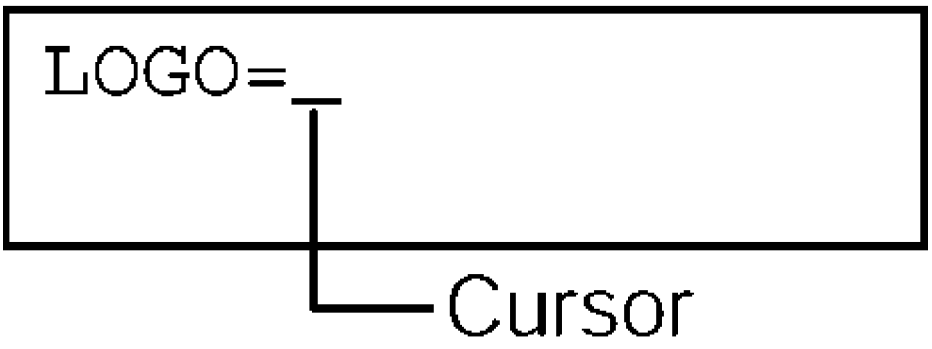
1. Press [MENU].
Display:



2. Press [◄] or [►] repeatedly to display the following.

3. Press [SET].

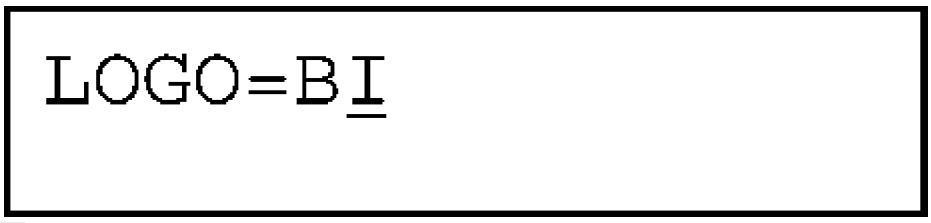
- Cursor (_) will appear on the display.



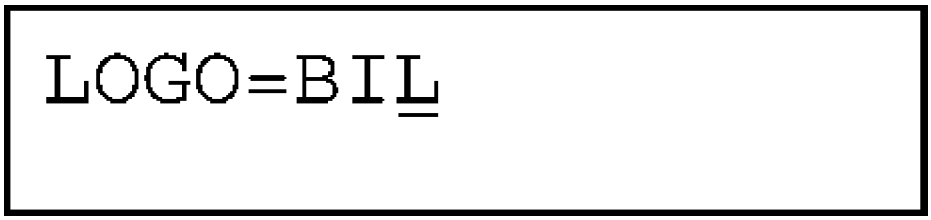
4. Enter your logo, up to 30 characters, by using the dial keypad.
Example: Bill

A. Press [2] 2 times.

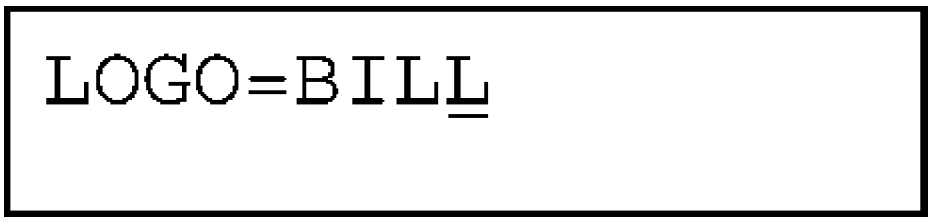
B. Press [4] 3 times.



C. Press [5] 3 times.



D. Press [►] to move the cursor to the next space and press [5] 3 times.



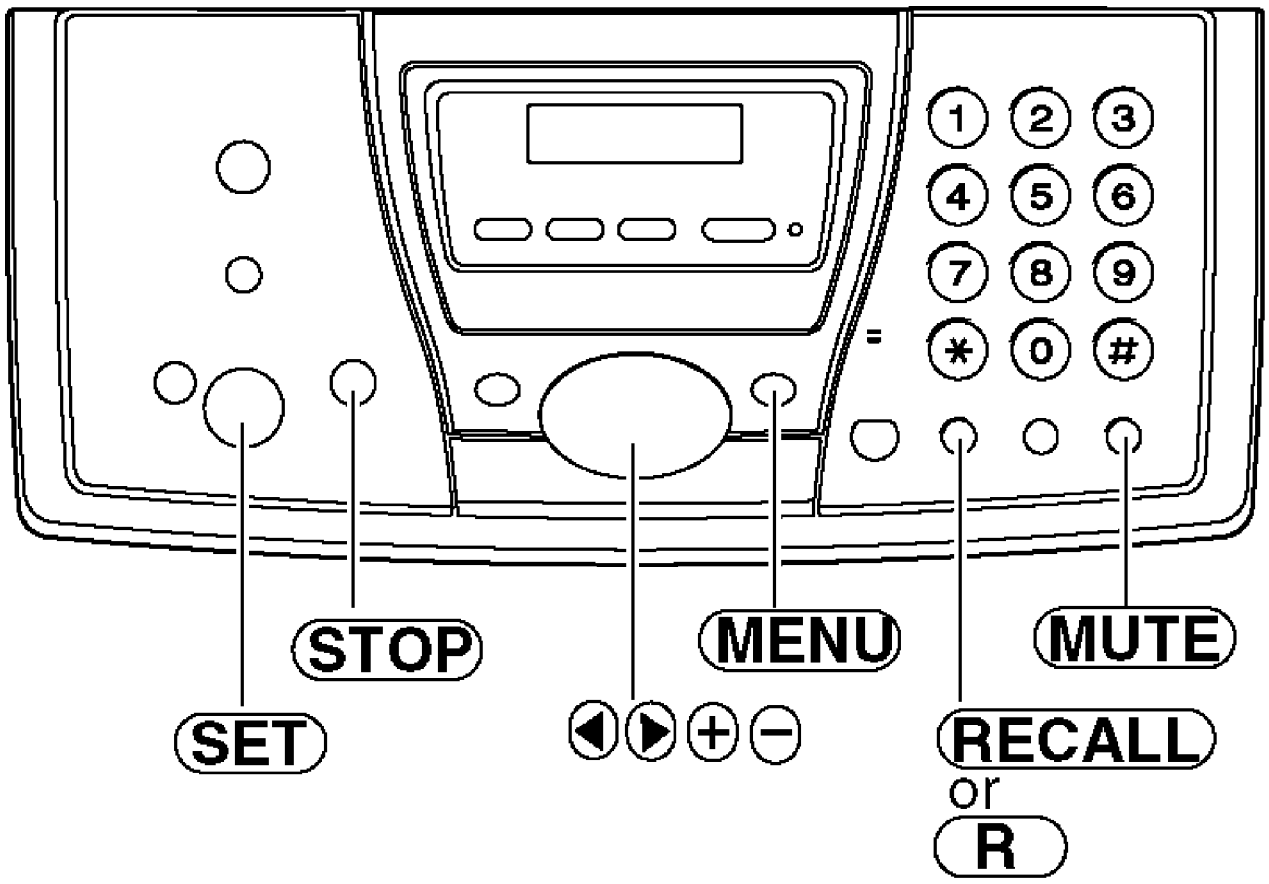
5. Press [SET].

- The next item will be displayed.

6. Press [MENU].

Note:

- **You can enter your logo by pressing [+] or [-].**



To change capital or lower-case letters

Pressing the [#] key will change to capital or lower-case alternately.

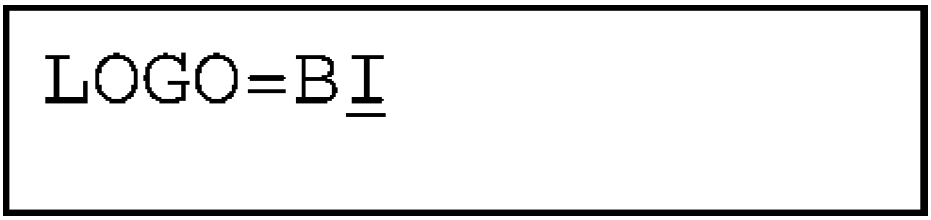
1. Press [2] 2 times.

LOGO=B

2. Press [4] 3 times.

LOGO=BI

3. Press #.



To correct a mistake

- Press ▶ or ◀ to move the cursor to the incorrect character, then make the correction.

To delete a character

- Move the cursor to the character you want to delete and press STOP.

To insert a character

1. Press ▶ or ◀ to move the cursor to the position to the right where you want to insert the character.
2. Press MUTE (Insert) to insert a space and enter the character

3.3.7. TO SELECT CHARACTERS WITH THE DIAL KEYPAD

Keys	Characters
【1】	1 [ ] { } + - / = , . _ ` : ; ? |
【2】	A Ä B C a ä b c 2
【3】	D E F d e f 3
【4】	G H I g h i 4
【5】	J K L j k l 5
【6】	M N O Ö m n o ö 6
【7】	P Q R S p q r s ß 7
【8】	T U Ü V t u ü v 8
【9】	W X Y Z w x y z 9
【0】	0 ( ) 〈 〉 ! " # $ % & ¥ * @ ^ ' →
【□】	To change capital or lower case letter.
【●】	**Hyphen** button (To insert a hyphen.)
【STUMM】	**Insert** button (To insert one character or one space.)
【STOP】	**Delete** button (To delete a character.)
【▶】	▶ key (To move the cursor to the right.) To enter another character using the same number key, move the cursor to the next space.
【◀】	◀ key (To move the cursor to the left.)

3.3.8. TO SELECT CHARACTERS USING ⊕ or ⊖

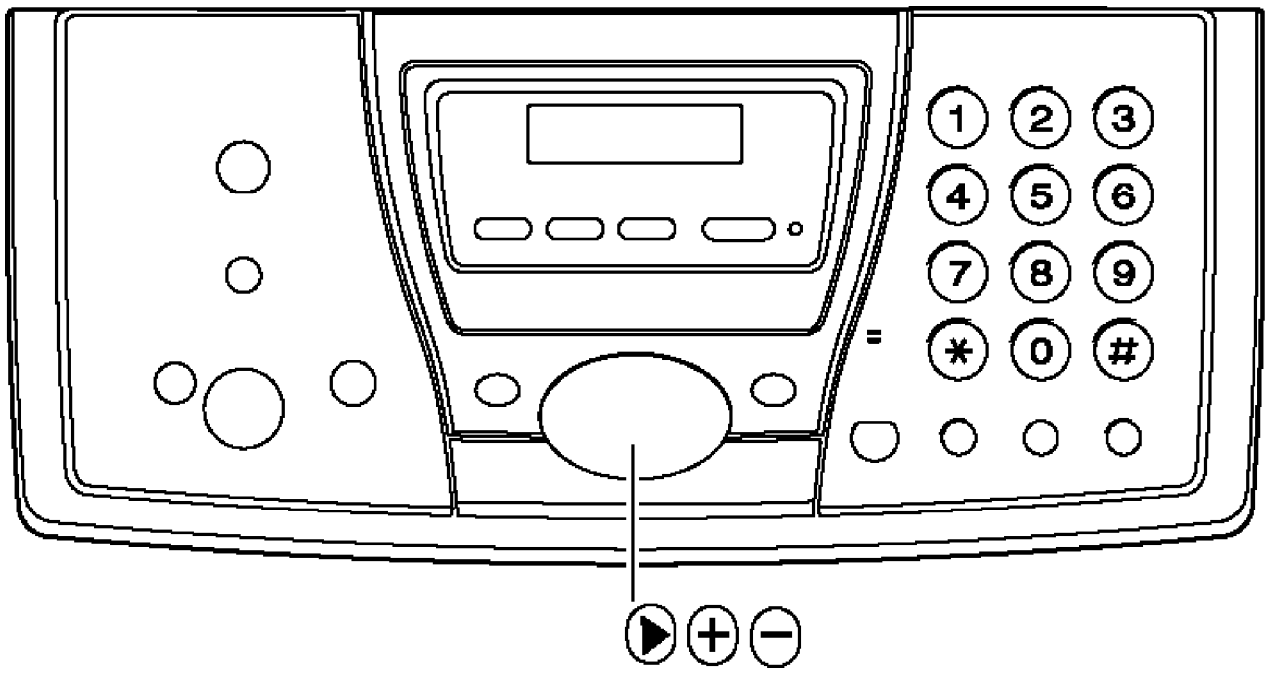
Instead of pressing the dial keys, you can select characters using ⊕ or ⊖.

1. Press ⊕ or ⊖ until the desired character is displayed.

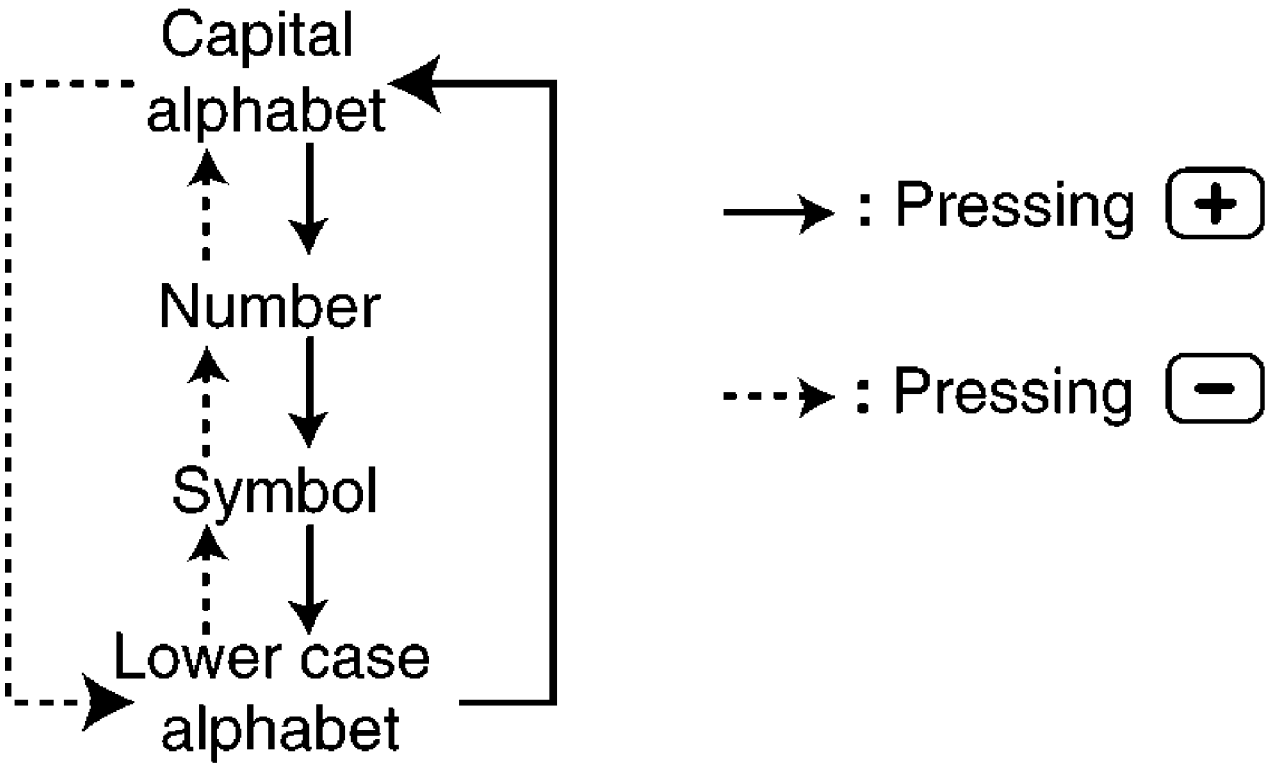
2. Press ▶ to move the cursor to the next space.

- The character displayed in step 1 is inserted.

3. Return to step 1 to enter the next character.



Display order of characters



3.3.9. INK FILM

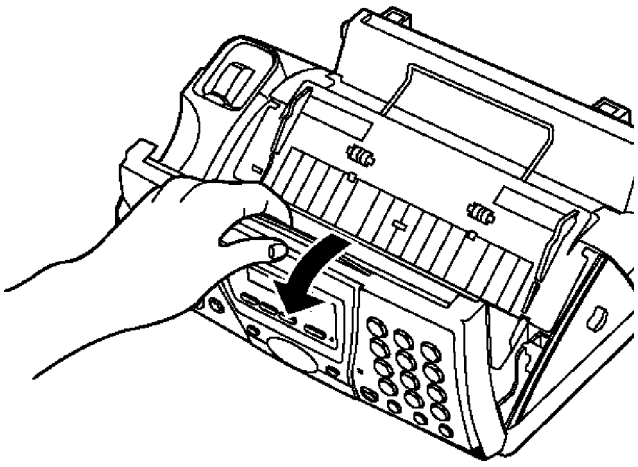
When the unit runs out of ink film, the following message will be displayed.

CHECK FILM

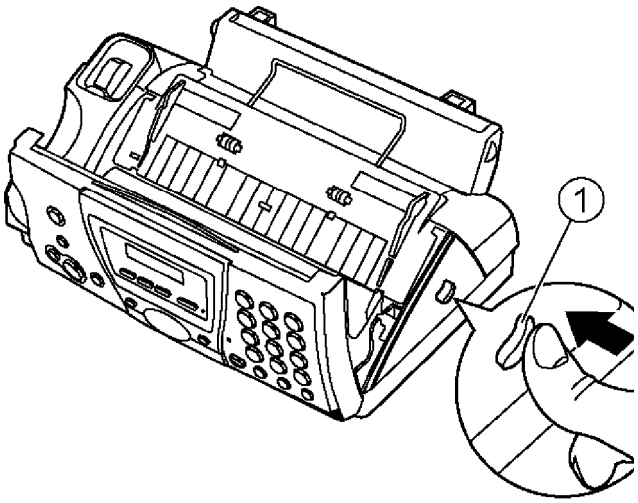
Install a new ink film. The following ink films are available for replacement. Each roll prints about 140 A4-sized pages.
Refer to OPTIONAL ACCESSORIES (
).
Model No. KX-FA54X: Replacement film (2 rolls)

3.3.9.1. Installing the ink film

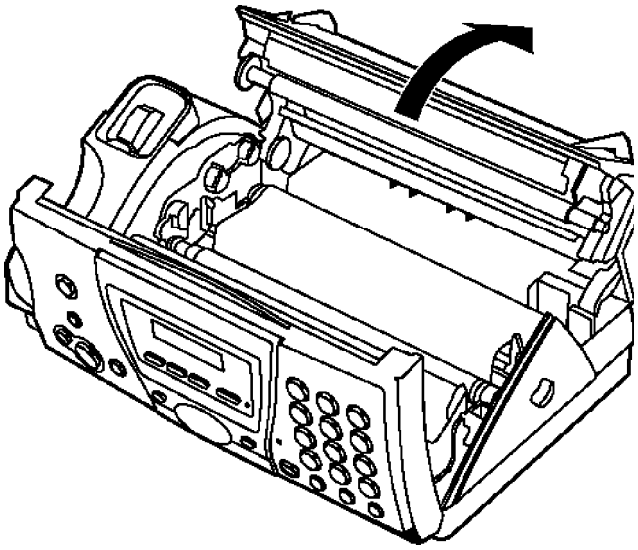
. Open the front cover by pulling up the centre part.



. Release the back cover by pushing the green utton (①).



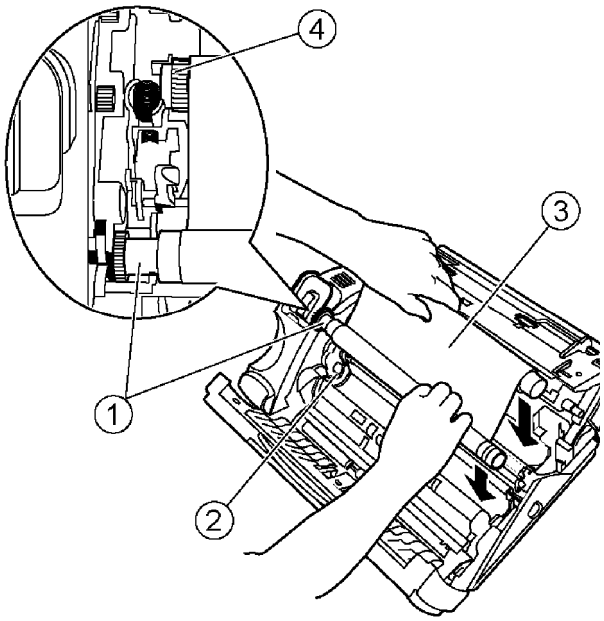
. Open the back cover.



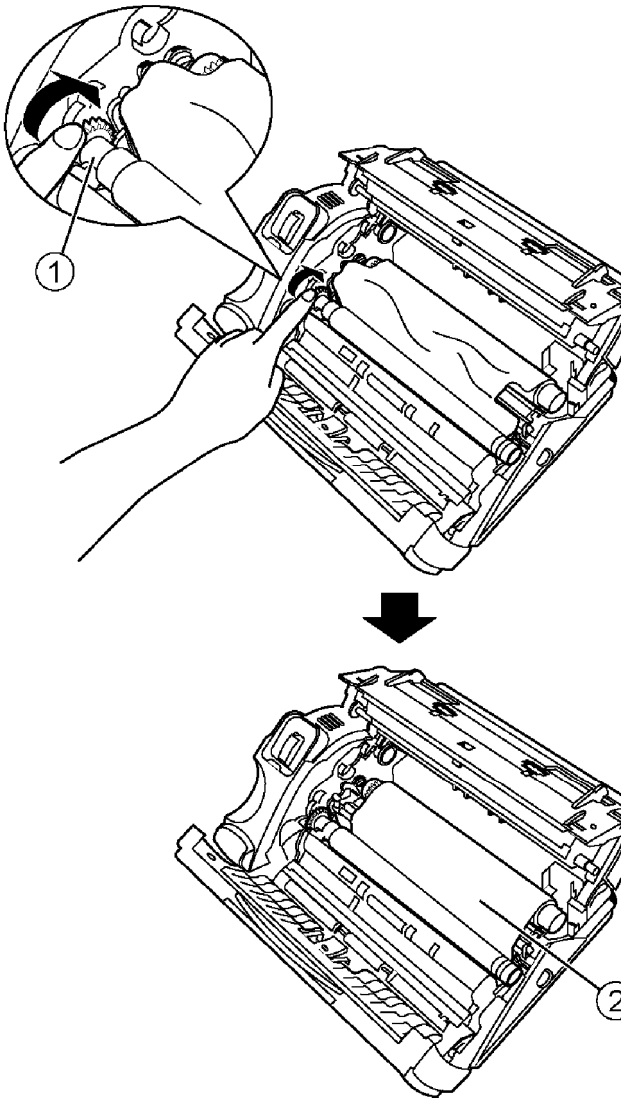
. Insert the front ink film roll by inserting its blue gear (①) into the left slot of the unit (②). Insert the ear ink film roll (③).

·The ink film is safe to touch, and will not rub off on your hands like carbon paper.

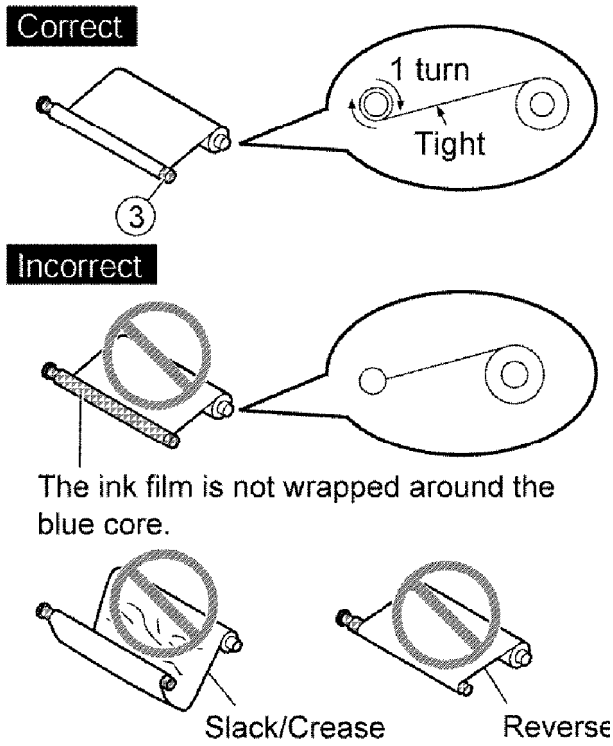
·Make sure the blue gear (①) and white gear (④) are installed as shown.



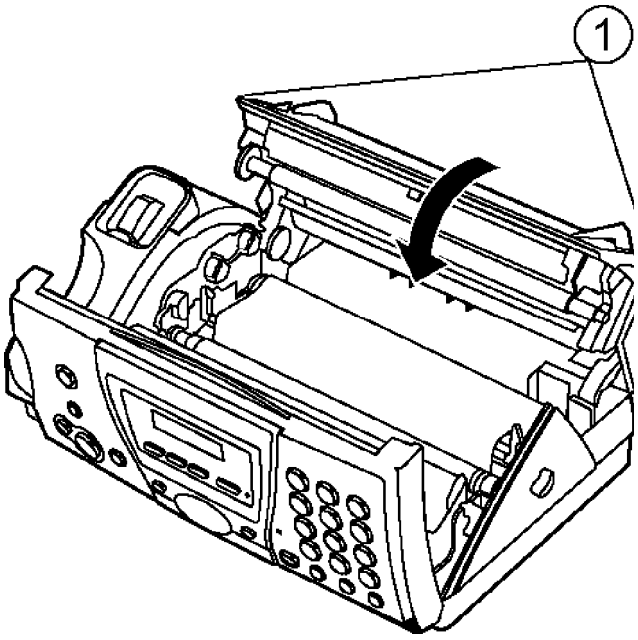
. Turn the blue gear (①) in the direction of the rrow until the ink film is tight (②).



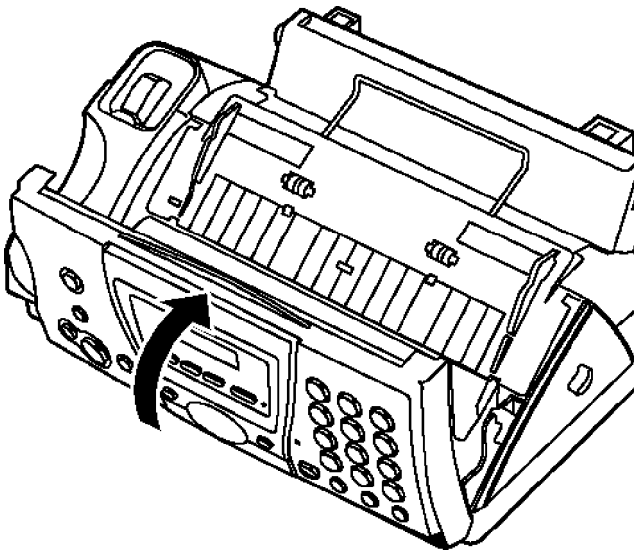
·Make sure that the ink film is wrapped around the blue core (③) at east once.



. Close the back cover securely, by pushing down on the notched area at both ends (①).



. Close the front cover securely.



3.3.9.2. Replacing the ink film

The included film roll is a starter ink film. To ensure that the unit operates properly, we recommend the use of Panasonic replacement film.

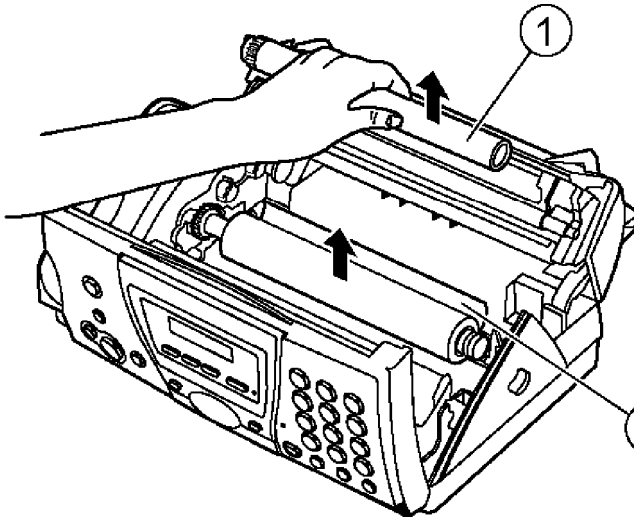
- **We cannot be responsible for any damage to the unit or degradation of print quality which may occur from the use of non-Panasonic replacement film.**

Important:

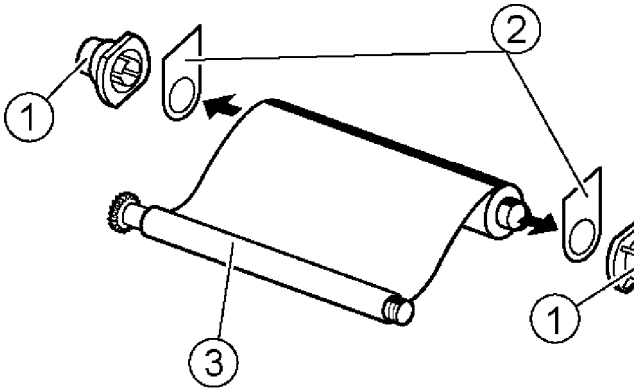
- **Remove the recording paper and the paper tray beforehand, or the paper may misfeed or jam.**

. Open the covers (see steps 1 to 3 on

. Remove the used core (①) and used ink film (②).



. Remove the stoppers (①) and tags (②) from the ew ink film (③).



. Insert the ink film and close the covers (see steps to 7 on

. Install the paper tray (
, then insert the recording paper (

4. MAINTENANCE

4.1. MAINTENANCE ITEMS AND COMPONENT LOCATIONS

4.1.1. OUTLINE

MAINTENANCE AND REPAIRS ARE PERFORMED USING THE FOLLOWING STEPS.

1. Periodic maintenance
Inspect the equipment periodically and if necessary, clean any contaminated parts.

2. Check for breakdowns
Look for problems and consider how they arose.
If the equipment can be still used, perform copying, self testing or communication testing.

3. Check equipment
Perform copying, self testing and communication testing to determine if the problem originates from the transmitter, receiver or the telephone line.

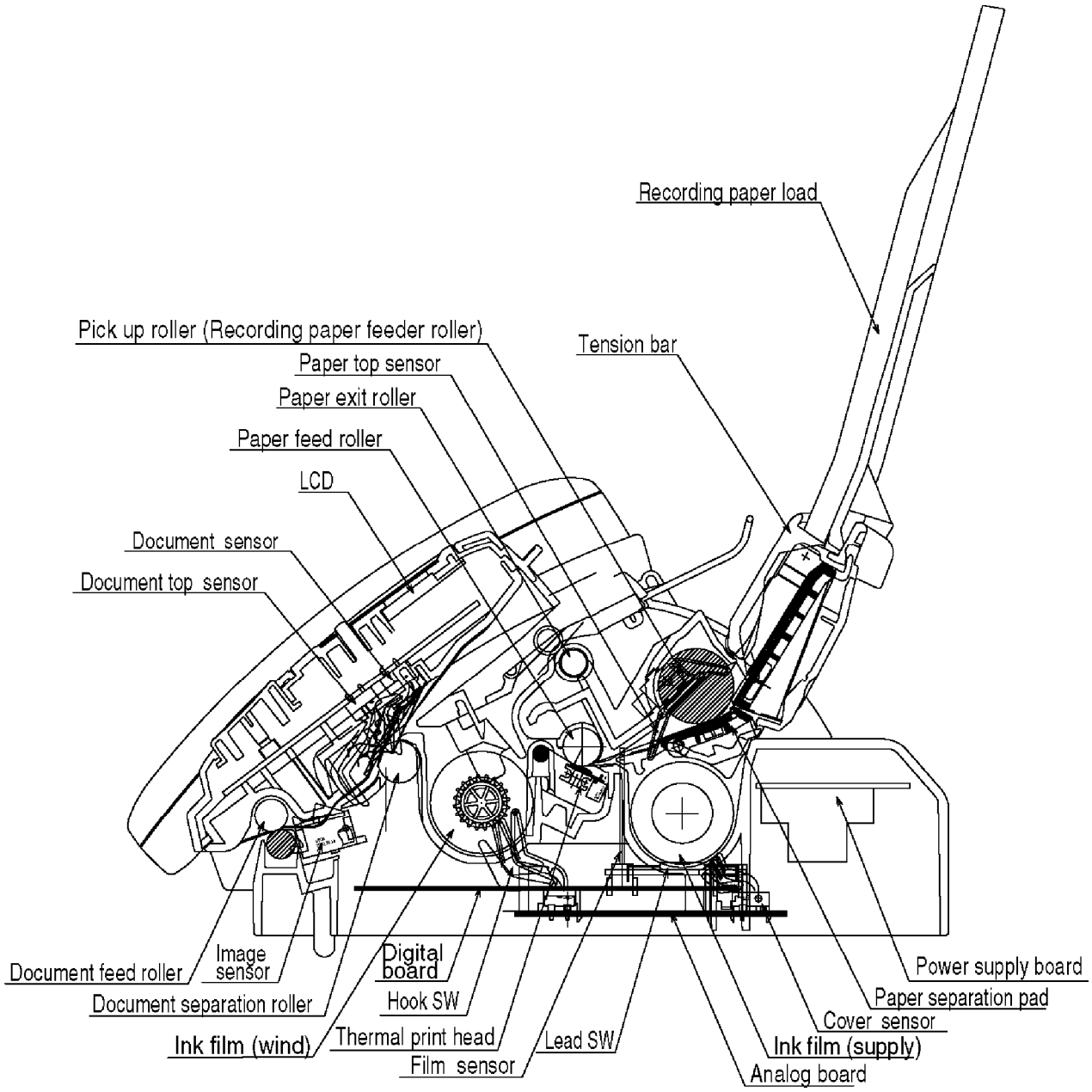
4. Determine causes
Determine the causes of the equipment problem by troubleshooting.

5. Equipment repairs
Repair or replace the defective parts and take appropriate measures at this stage to ensure that the problem will not recur.

6. Confirm normal operation of the equipment
After completing the repairs, conduct copying, self testing and communication testing to confirm that the equipment operates normally.

7. Record keeping
Make a record of the measures taken to rectify the problem for future reference.

4.1.2. MAINTENANCE CHECK ITEMS/COMPONENT LOCATIONS



4.1.2.1. MAINTENANCE LIST

NO.	OPERATION	CHECK	REMARKS
1	Document Path	Remove any foreign matter such as paper.	—
2	Rollers	If the roller is dirty, clean it with a damp cloth then dry thoroughly.	Refer to Recording paper feeder cleaning (Pick up roller cleaning)( ), Document feeder/scanne glass cleaning (Separation roller cleaning)( ).
3	Platen Roller	If the platen is dirty, clean it with a damp cloth then dry thoroughly. Remove the paper and film cartridge before cleaning.	—
4	Thermal Head	If the thermal head is dirty, clean the printing surface with a cloth moistened with denatured alcohol (alcohol without water), then dry thoroughly.	Refer to Thermal head cleaning( ).
5	Sensors	Hook switch (SW201), Paper top sensor (PS501), Film end (SW501)/Cover open switch (SW102), Document top switch (SW353), Document set switch (SW352). Confirm the operation of the sensors.	See MAINTENANCE CHECI ITEMS/COMPONENT LOCATIONS( ) and SENSORS AND SWITCHES ( ).
6	Glass	If the glass is dirty, clean them with a dry soft cloth.	Refer to Document feeder/ scanner glass cleaning (Separation roller cleaning).
7	Abnormal, wear and tear or loose parts	Replace the part. Check if the screws are tight on all parts.	—

4.1.2.2. MAINTENANCE CYCLE

No.	Item	Cleaning Cycle	Replacement	
			Cycle	Procedure
1	Separation Roller (Ref. No. 131)	3 months	7 years* (31,500 documents)	Refer to How to Remov the SEPARATION ROLLER( ).
2	Separation Rubber (Ref. No.5)	3 months	7 years (31,500 documents)	Refer to MAINTENANCE CHECK ITEMS/ COMPONENT LOCATIONS( )
3	Feed Rollers (Ref. No. 1,51)	3 months	7 years (31,500 documents)	Refer to DISASSEMBLY INSTRUCTIONS( ). ( )
4	Thermal Head (Ref. No. 35)	3 months	7 years (31,500 documents)	Refer to How to Remov the THERMAL HEAD( ).
5	Paper Feed Roller (Ref. No. 90)	3 months	7 years (31,500 documents)	Refer to How to Remov the PICKUP ROLLER AND PAPER FEED ROLLER( ).
6	Pickup Roller (Ref. No. 79)	3 months	7 years (31,500 documents)	Refer to How to Remov the PICKUP ROLLER AND PAPER FEED ROLLER( ).

4.1.3. Recording paper feeder cleaning (Pick up roller cleaning)

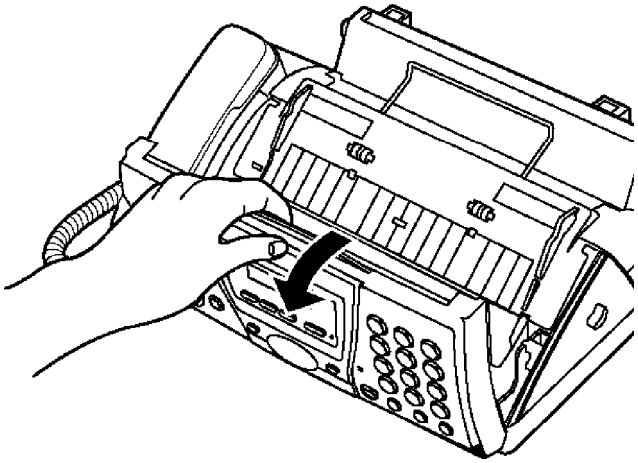
Clean the recording paper feeder when:
- The recording paper frequently misfeeds.

Important:

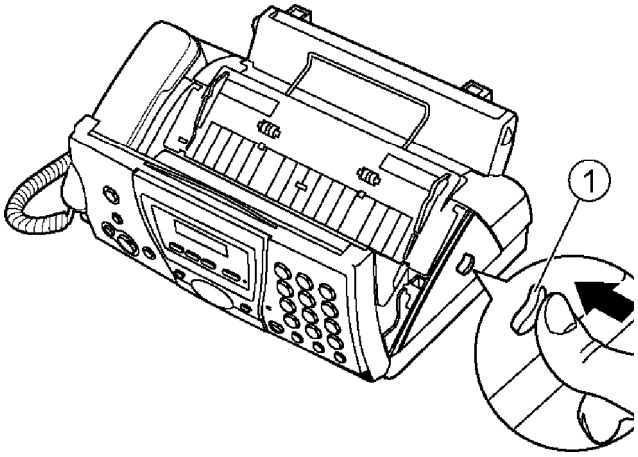
- **Remove the recording paper and the paper tray beforehand, or the paper may misfeed or jam.**

. Disconnect the mains lead and the telephone line ord.

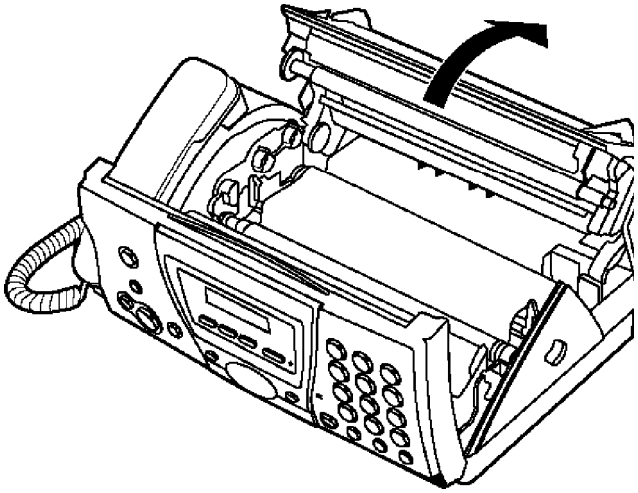
. Open the front cover by pulling up the centre part.



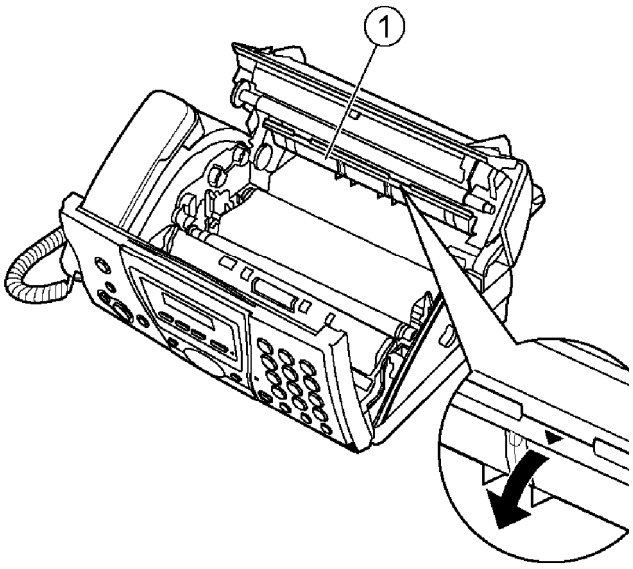
. Release the back cover by pushing the green utton (①).



. Open the back cover.



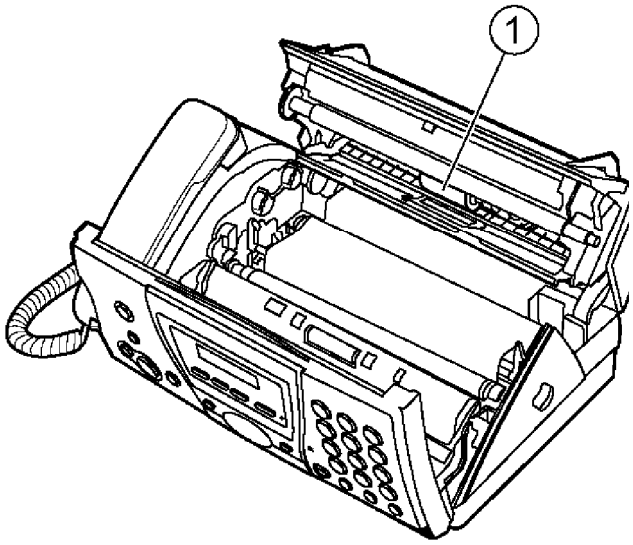
. Open the recording paper feeder cover (①).



. Clean the recording paper feeder roller (①) with a loth moistened with isopropyl rubbing alcohol, and et all parts dry thoroughly.

Caution:

Do not use paper products, such as paper towels or tissues.



. Close the covers.

. Install the paper tray (

, then insert the recording paper (

.

. Connect the mains lead and the telephone line ord.

4.1.4. Document feeder/scanner glass cleaning (Separation roller cleaning)

Clean the document feeder/scanner when:

- Documents frequently misfeed.

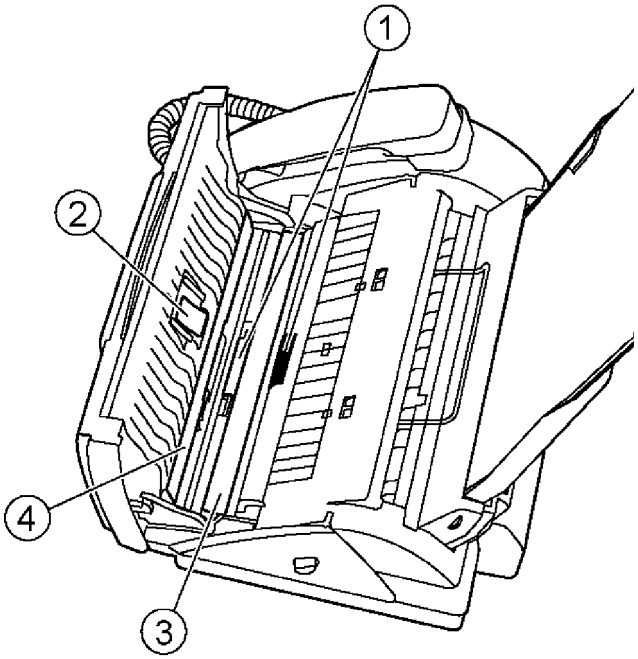
- Smudges or black/white lines appear on the original document when transmitting or copying.

1. Disconnect the mains lead and the telephone line cord.

2. Open the front cover by pulling up the centre part.

3. Clean the document feeder rollers (1) and rubber flap (2) with a cloth moistened with isopropyl rubbing alcohol, and let all parts dry thoroughly.

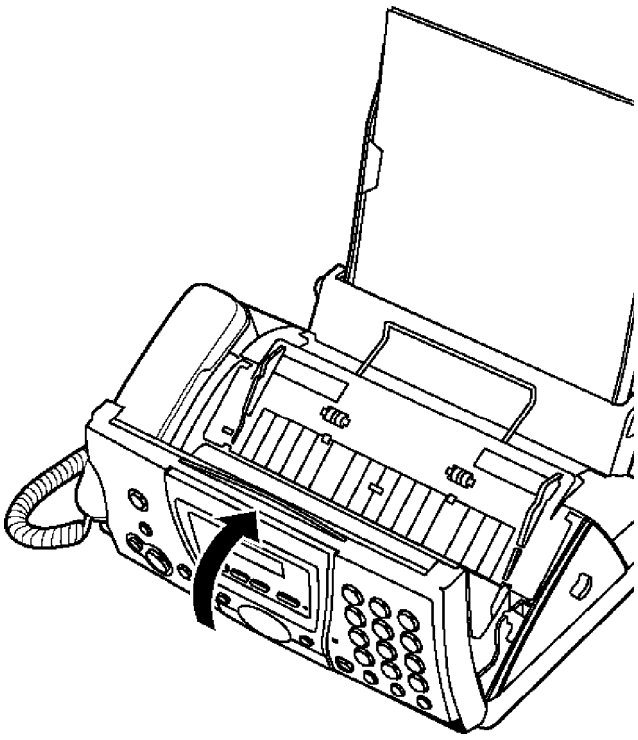
Clean the scanner glass (3) and white plate opposite the glass (4) with a soft, dry cloth.



Caution:

Do not use paper products, such as paper towels or tissues.

. Close the front cover securely.



. Connect the mains lead and the telephone line
ord.

4.1.5. Thermal head cleaning

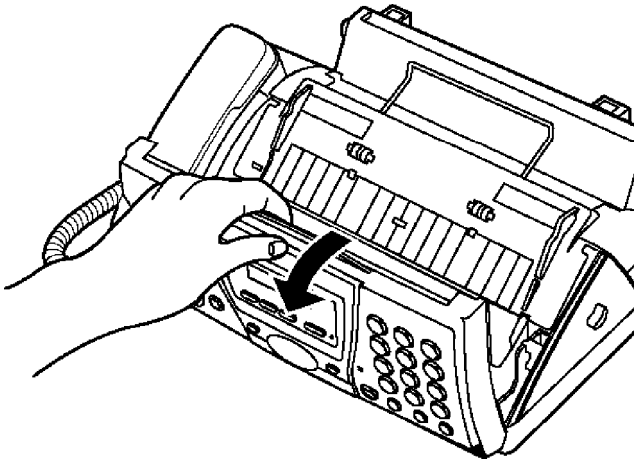
If smudges or black/white lines appear on a copied/received document, check whether there is dust on the thermal head. Clean the thermal head to remove the dust.

Important:

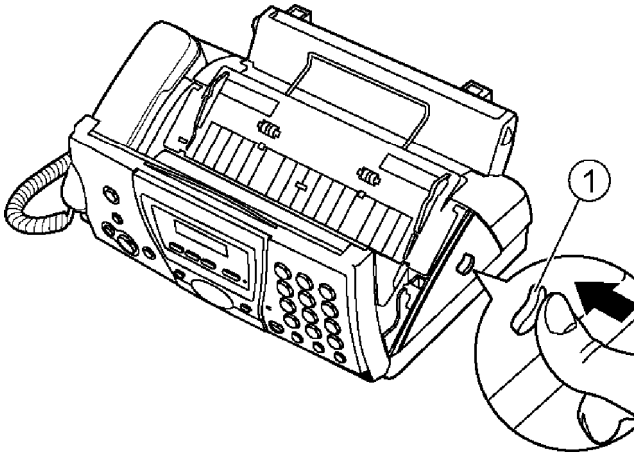
- **Remove the recording paper and the paper tray beforehand, or the paper may misfeed or jam.**

. Disconnect the mains lead and the telephone line ord.

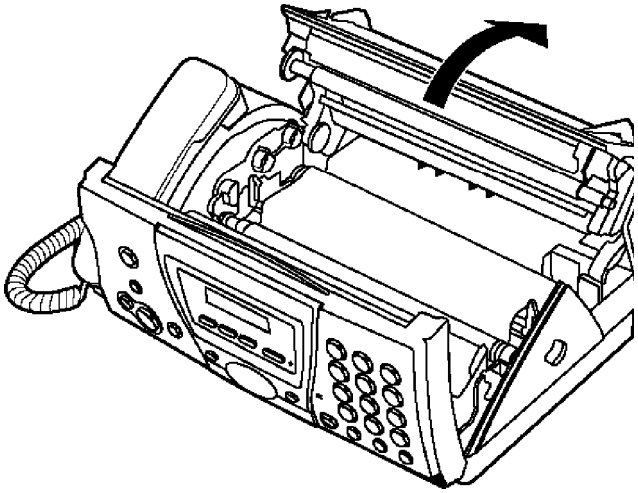
. Open the front cover by pulling up the centre part.



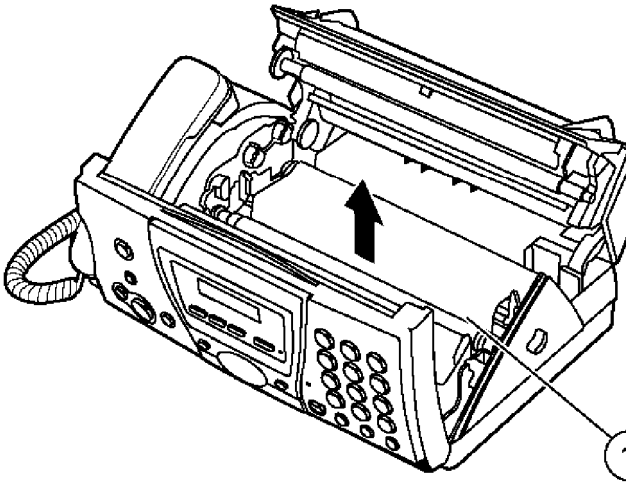
. Release the back cover by pushing the green utton (①).



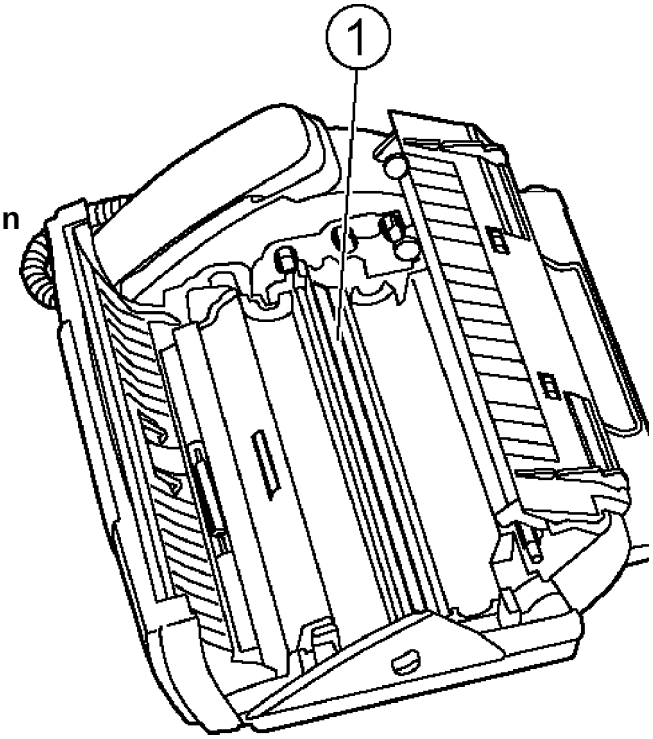
. Open the back cover.



. Remove the ink film (①).



. Clean the thermal head (①) with a cloth moistened with isopropyl rubbing alcohol, and let it dry thoroughly.



Caution:

To prevent a malfunction due to static electricity, do not use a dry cloth and do n touch the thermal head directly.

. Reinstall the ink film and close the covers (see teps 4 to 7 on

. Install the paper tray (
, then insert the recording paper (

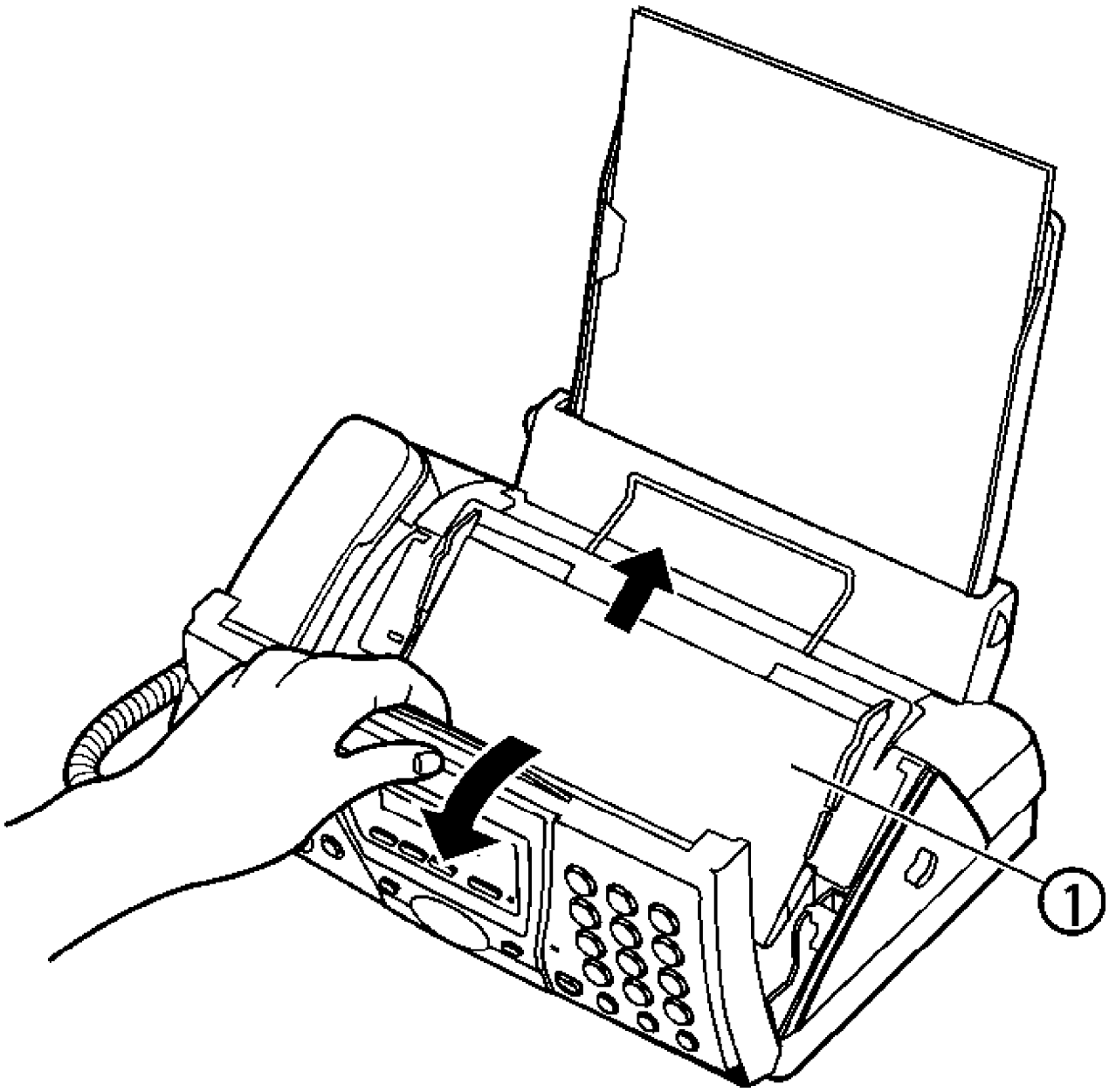
. Connect the mains lead and the telephone line ord.

4.2. DOCUMENT JAMS

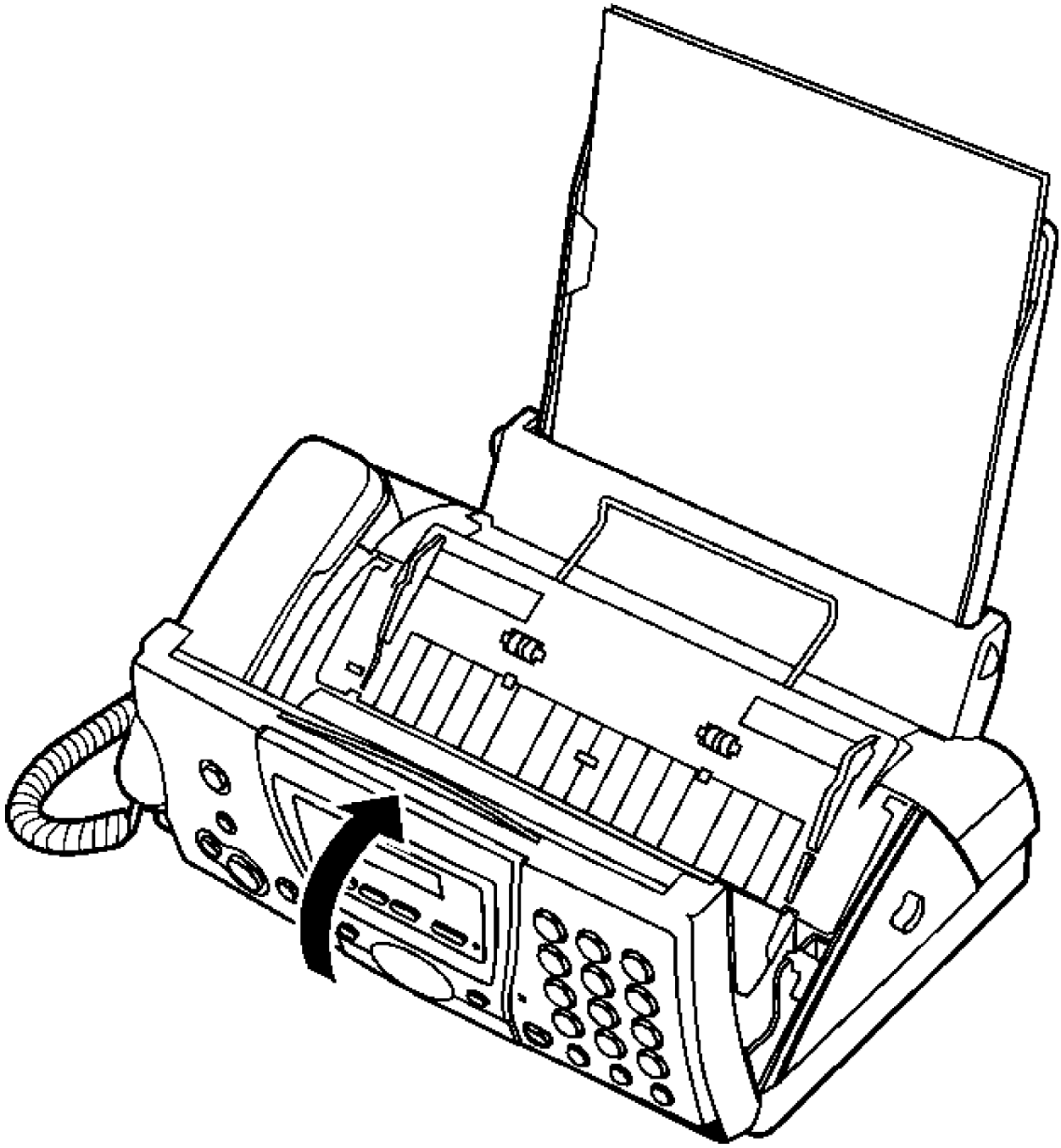
If the unit does not release the document during feeding, remove the jammed document as follows.

1. Open the front cover by pulling up the center part.

2. Remove the jammed document carefully (①).



3. Close the front cover securely.



Note:

- **Do not pull out the jammed paper forcibly before opening the front cover.**

4.3. RECORDING PAPER JAMS

If the unit does not eject any recording paper during reception or copying, the recording paper has jammed and the display will show the following massage.

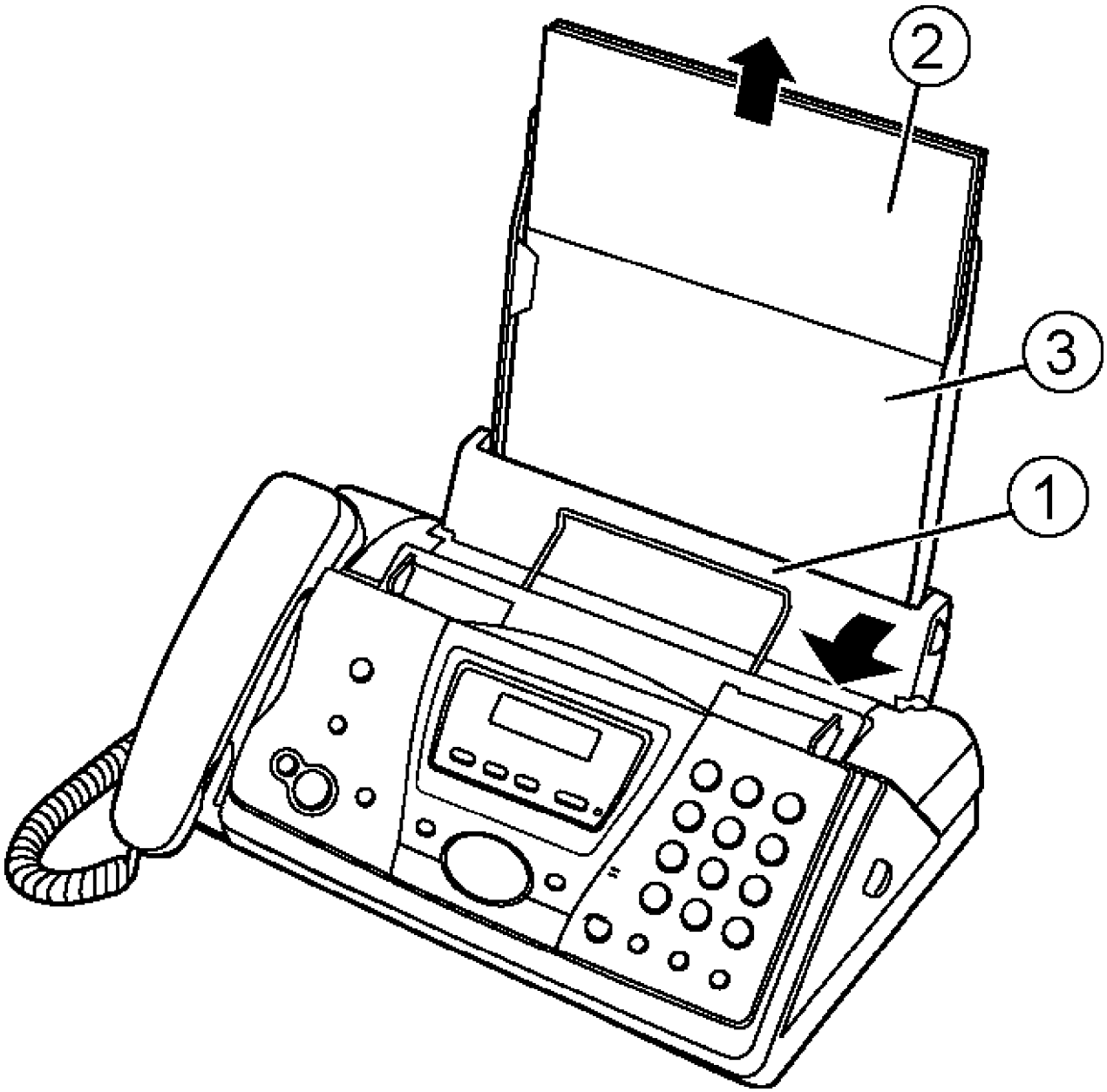
When the recording paper has jammed in the unit.

The display will show the following.

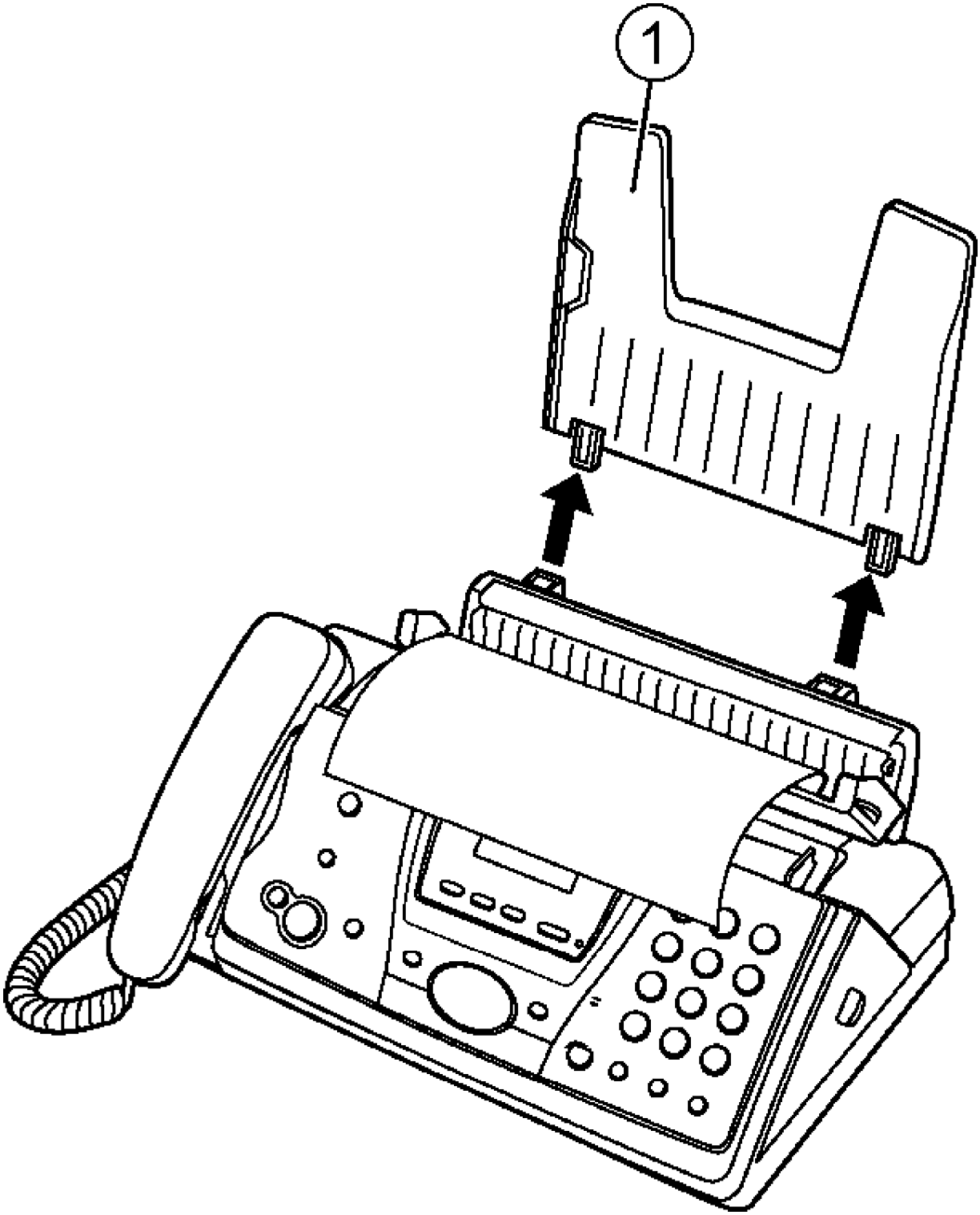
PAPER JAMMED

1. Pull the tension plate forward (①) to remove the installed paper (②).

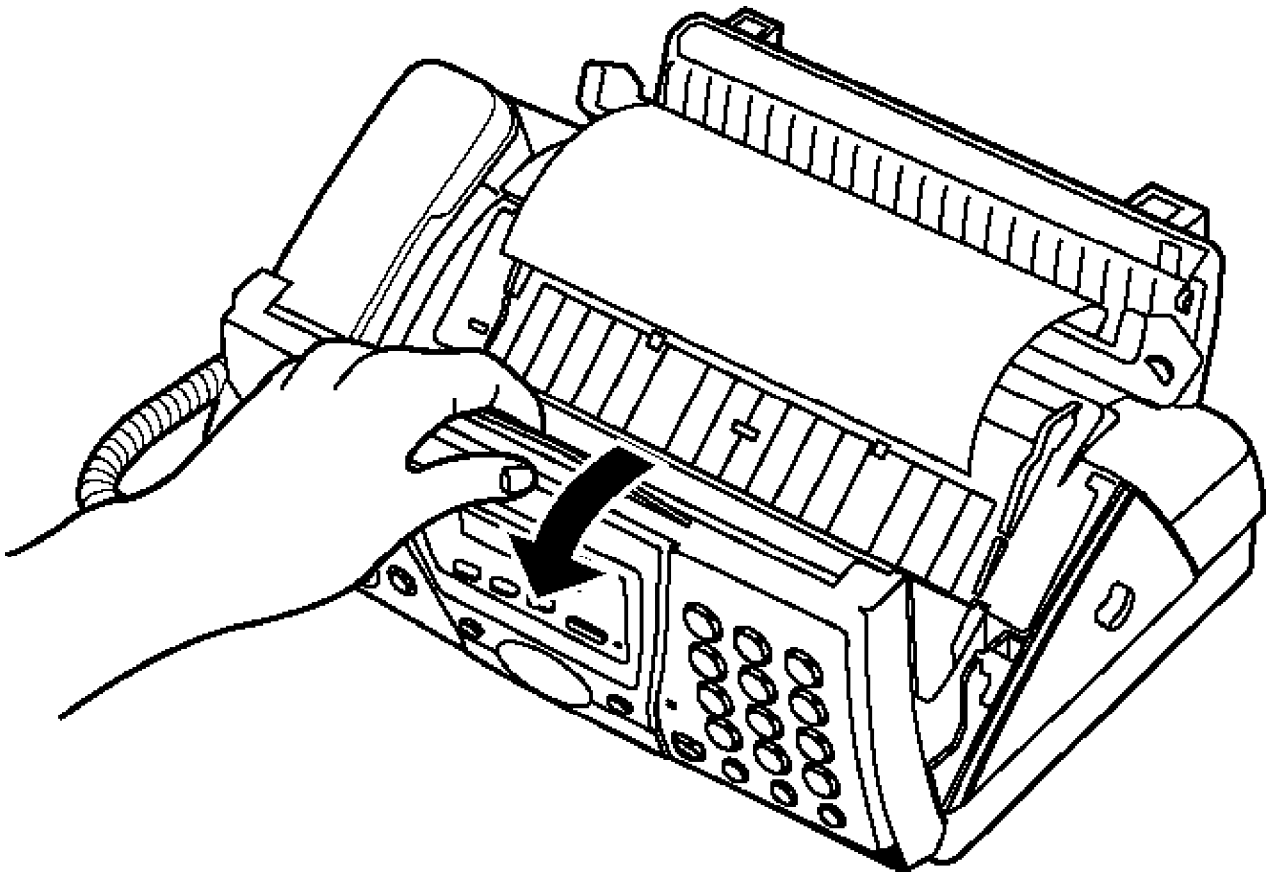
- Do not remove the jammed paper (③).



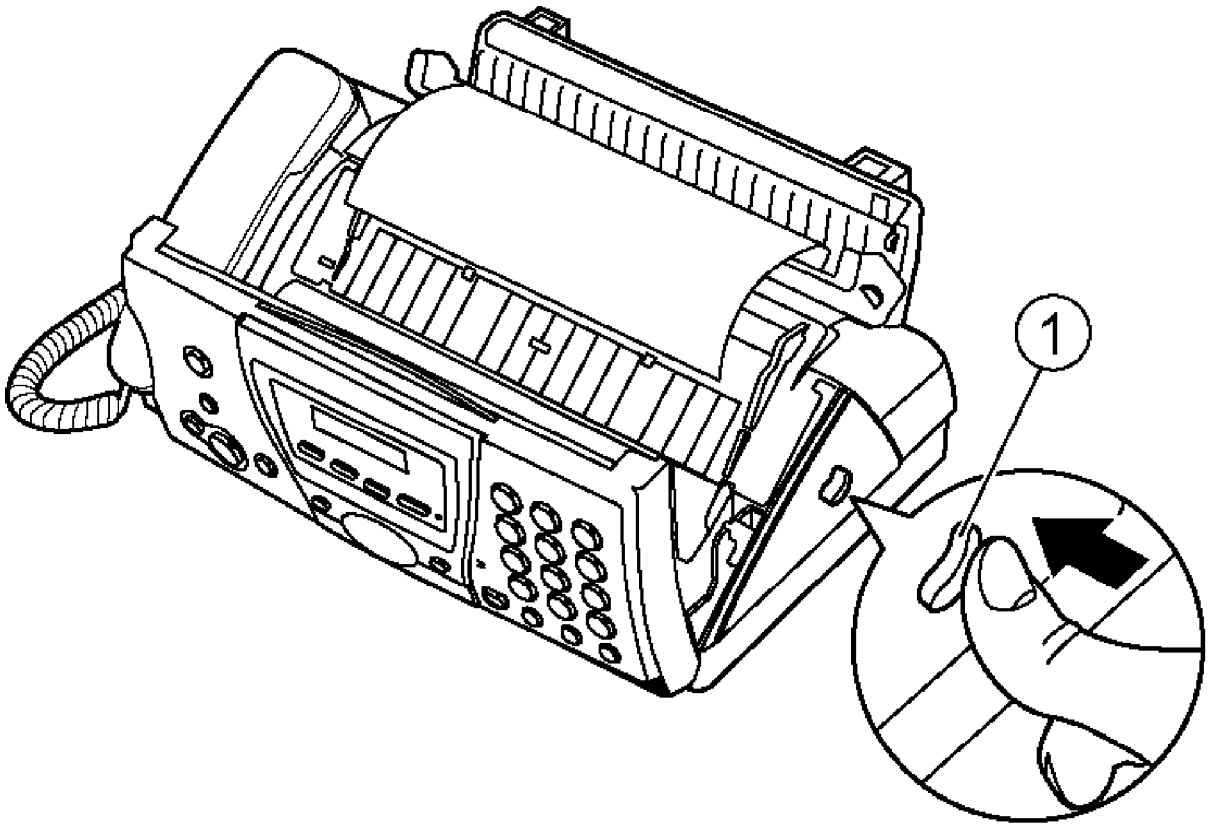
2. Remove the paper tray (①).



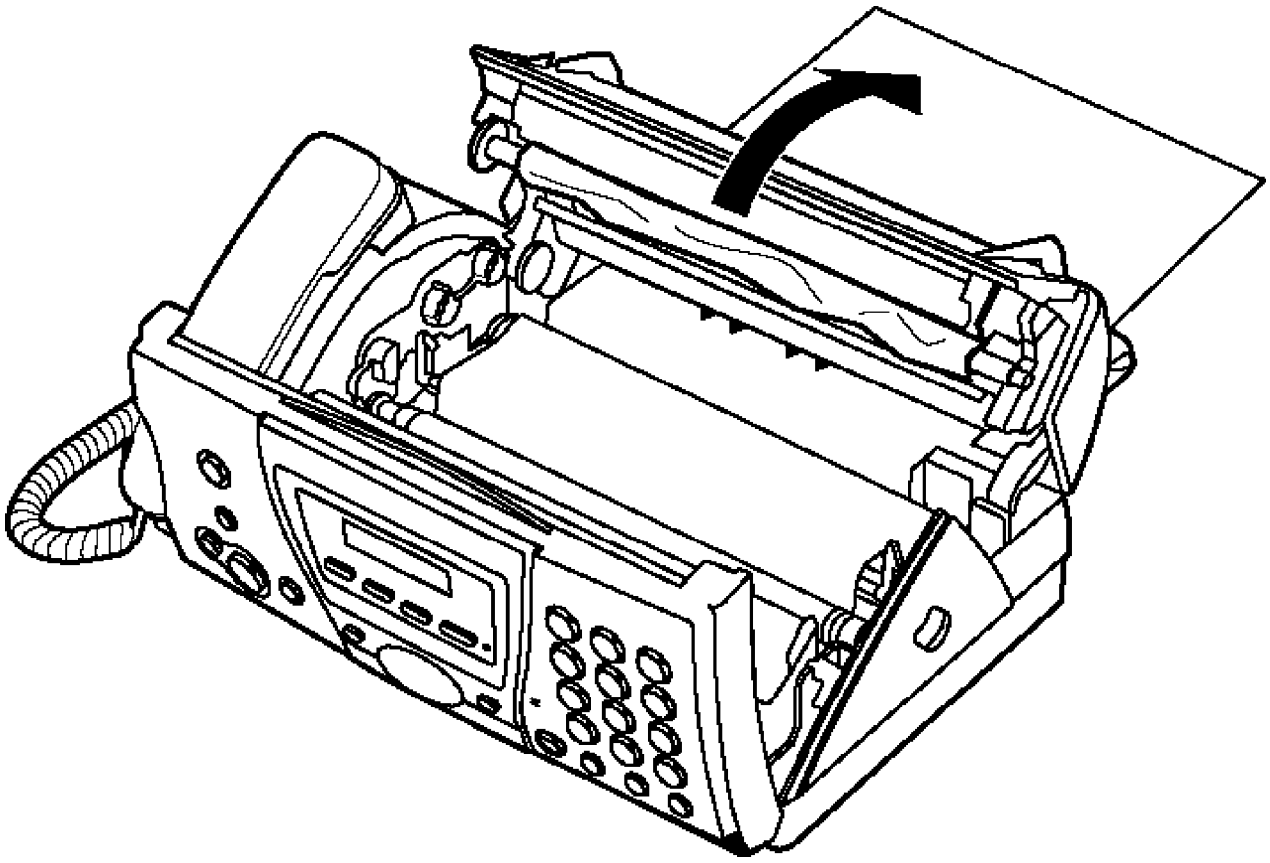
3. Open the front cover by pulling up the centre part.



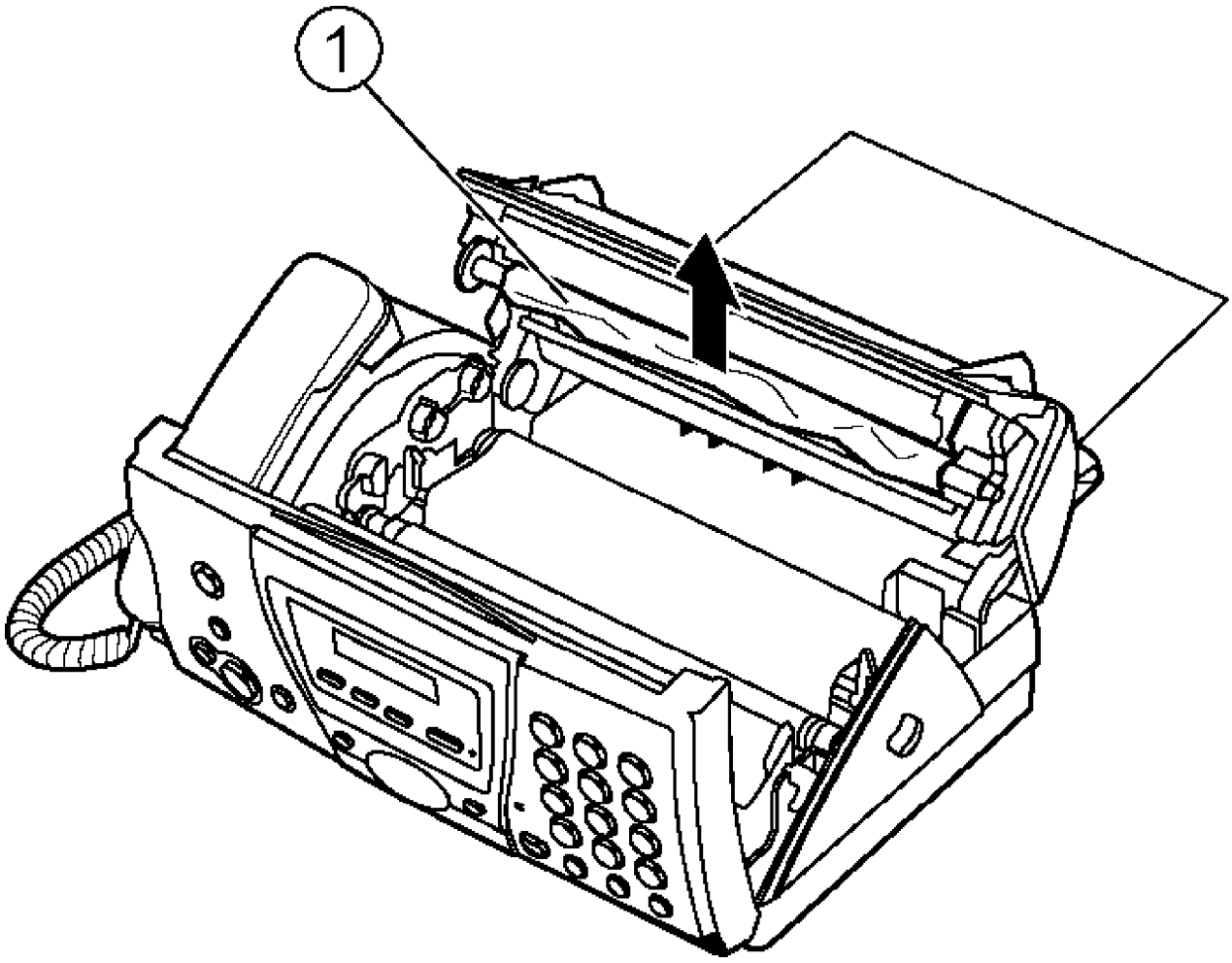
4. Release the back cover by pushing the green button (①).



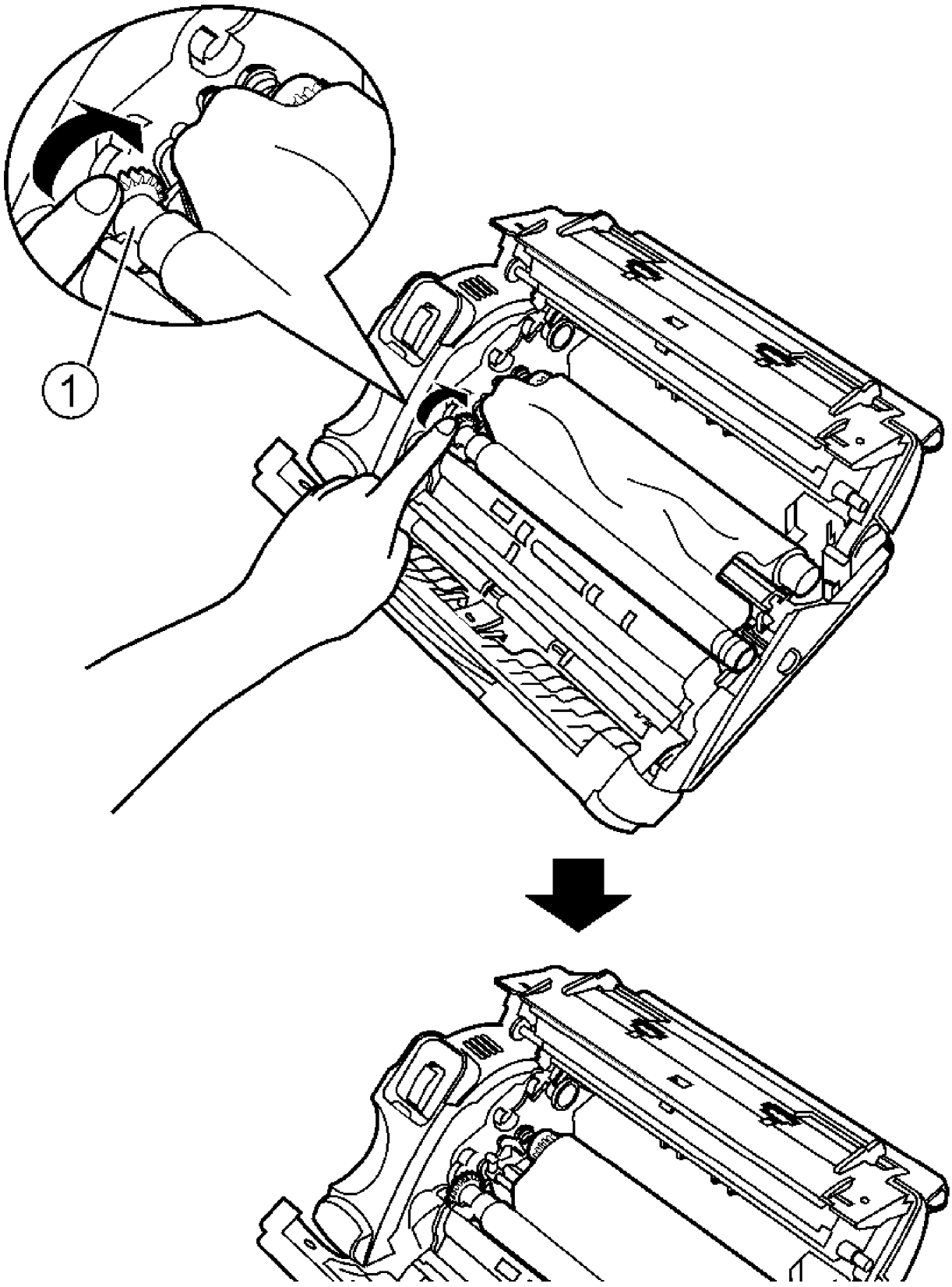
5. Open the back cover.

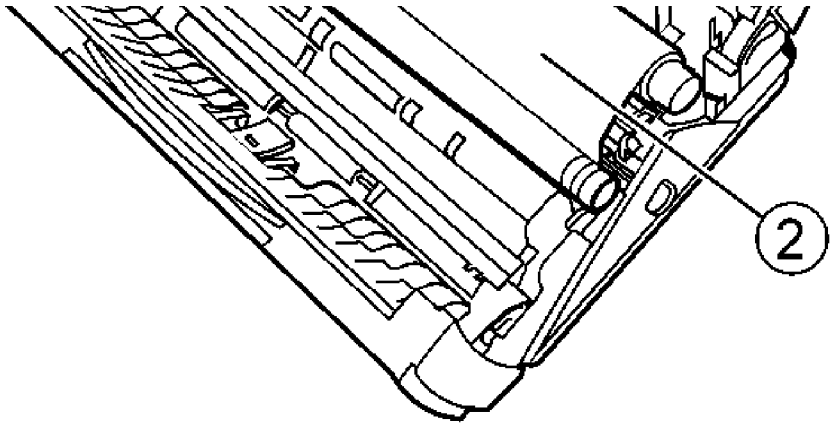


6. Remove the jammed recording paper (①).

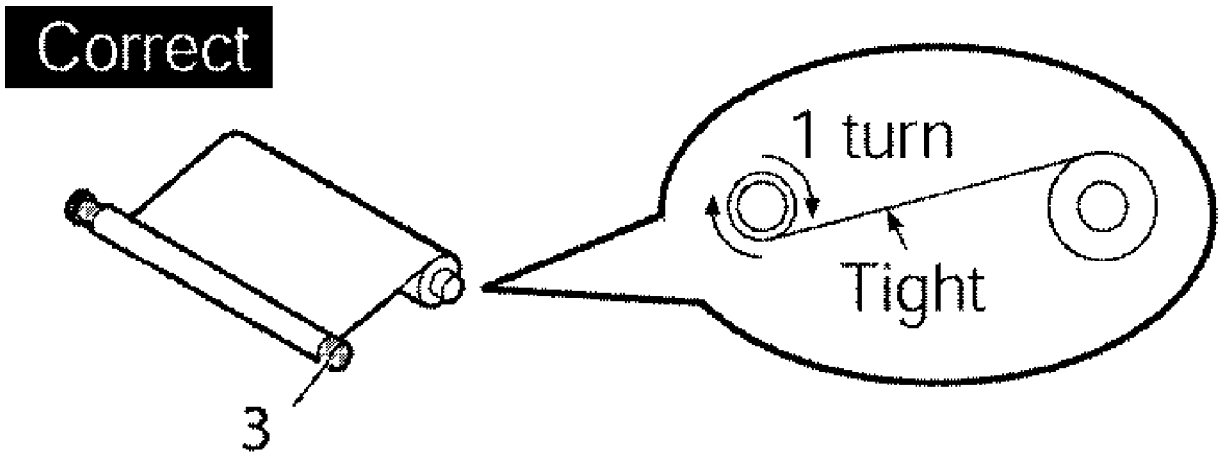


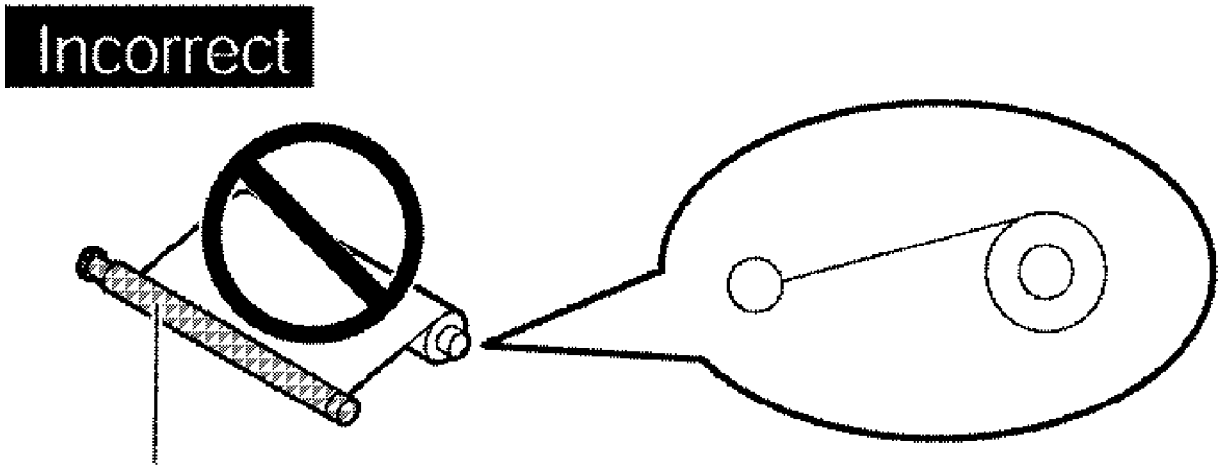
7. Turn the blue gear (①) in the direction of the arrow until the ink film is tight (②).


1

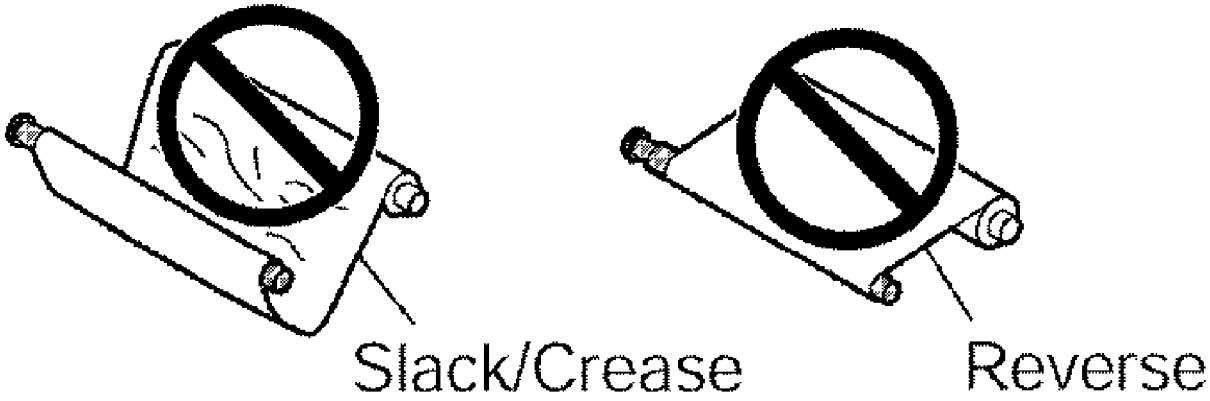


- **Make sure that the ink film is wrapped around the blue core (③) at least once.**

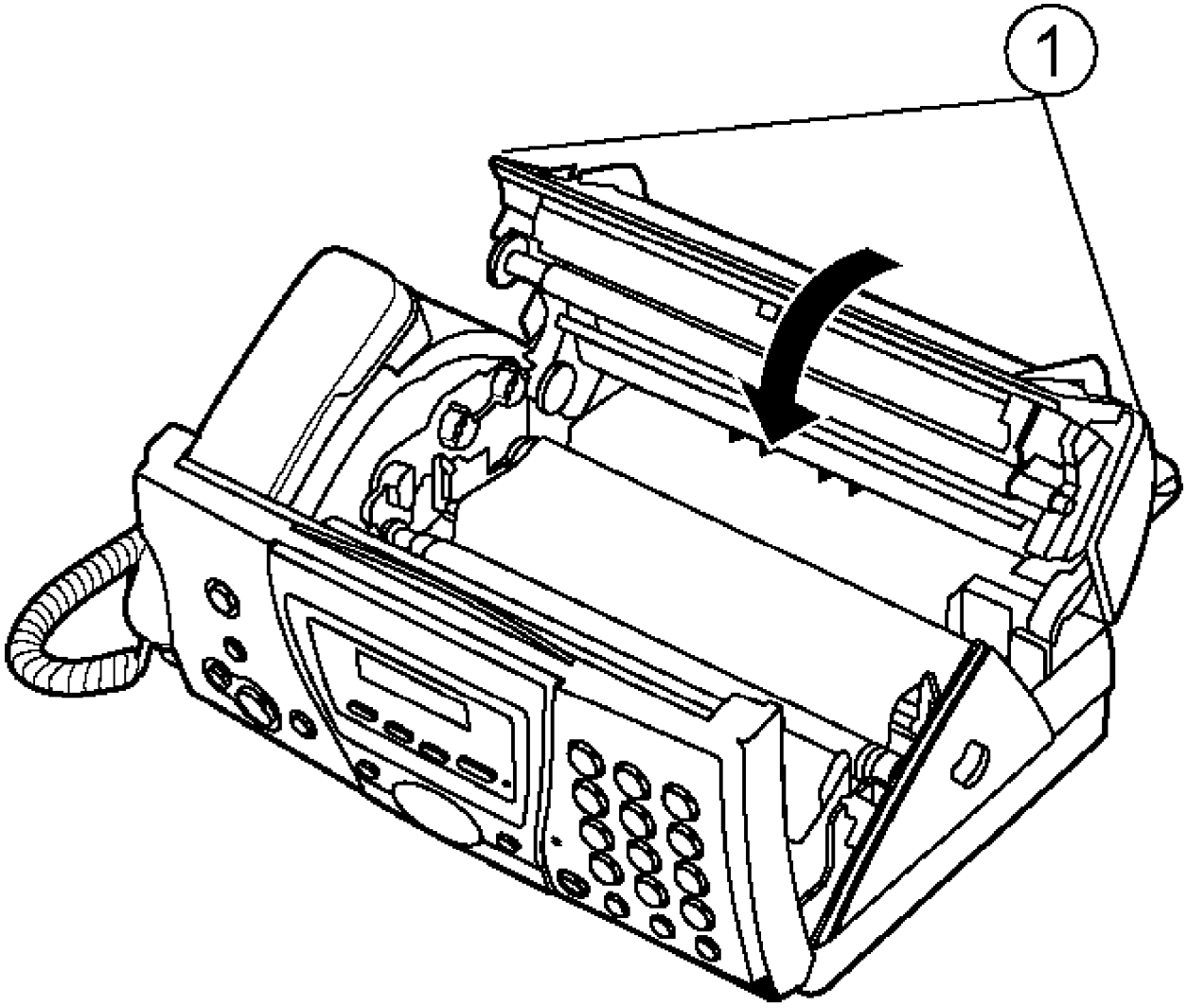




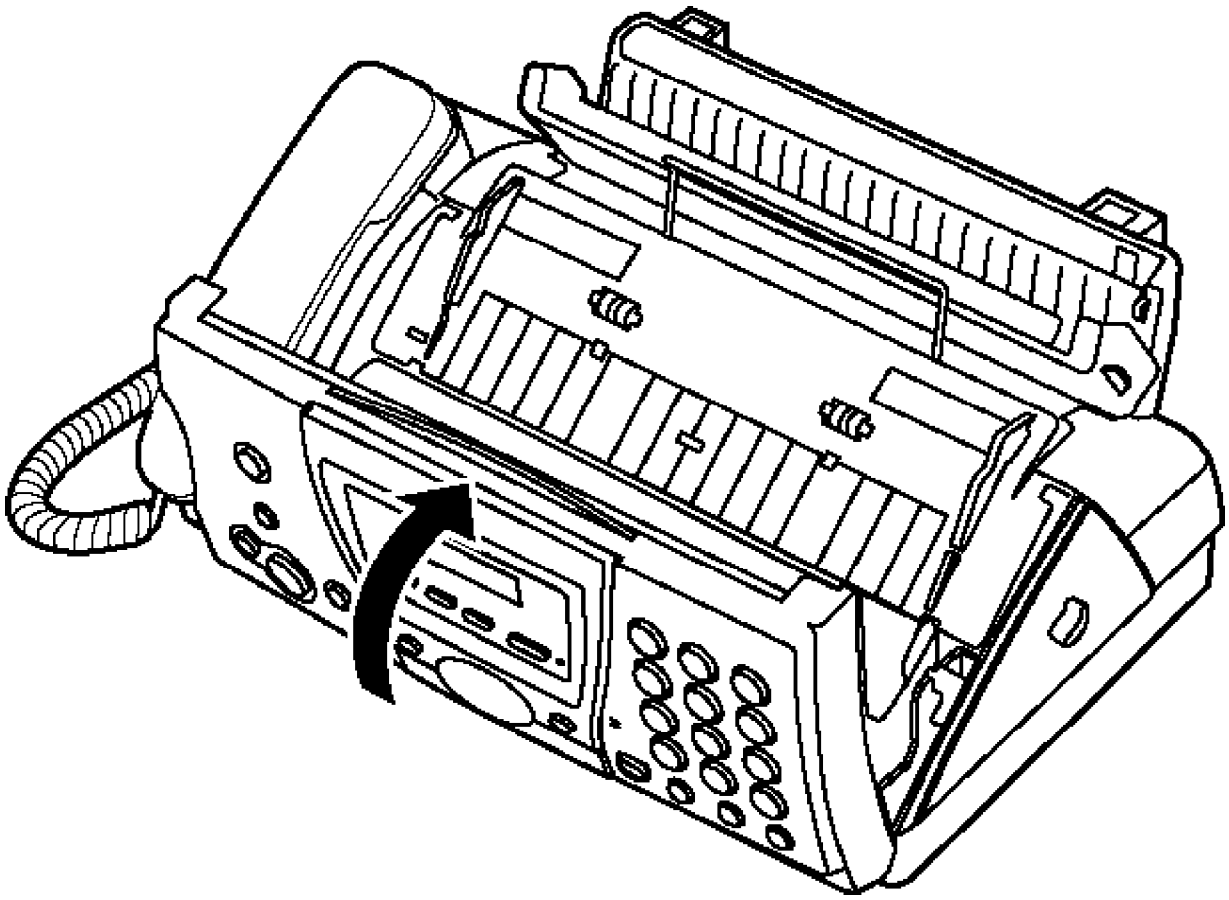
The ink film is not wrapped around the blue core.



8. Close the back cover, then push down on the notched area at both ends (①) to close securely.



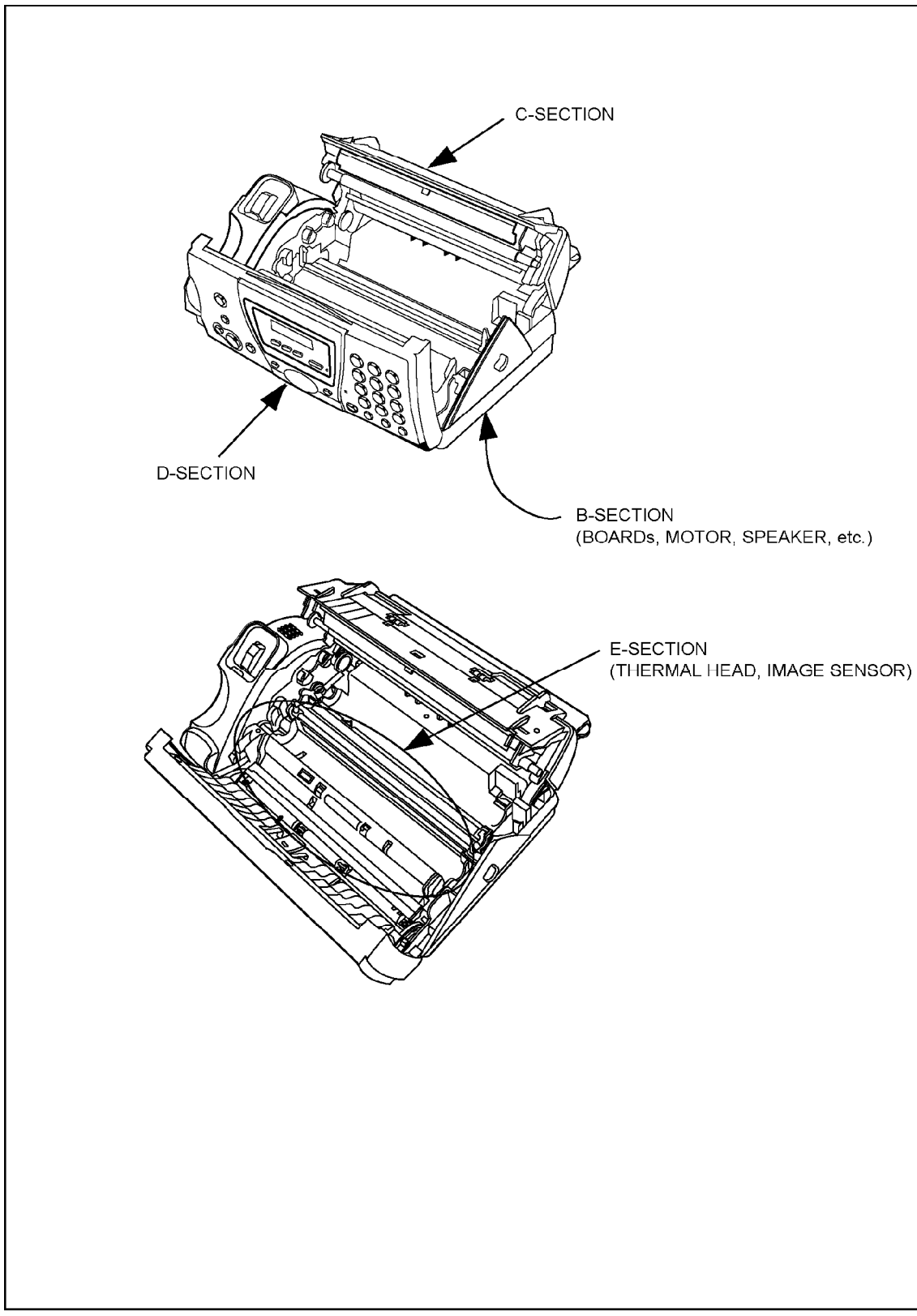
9. Close the front cover securely.



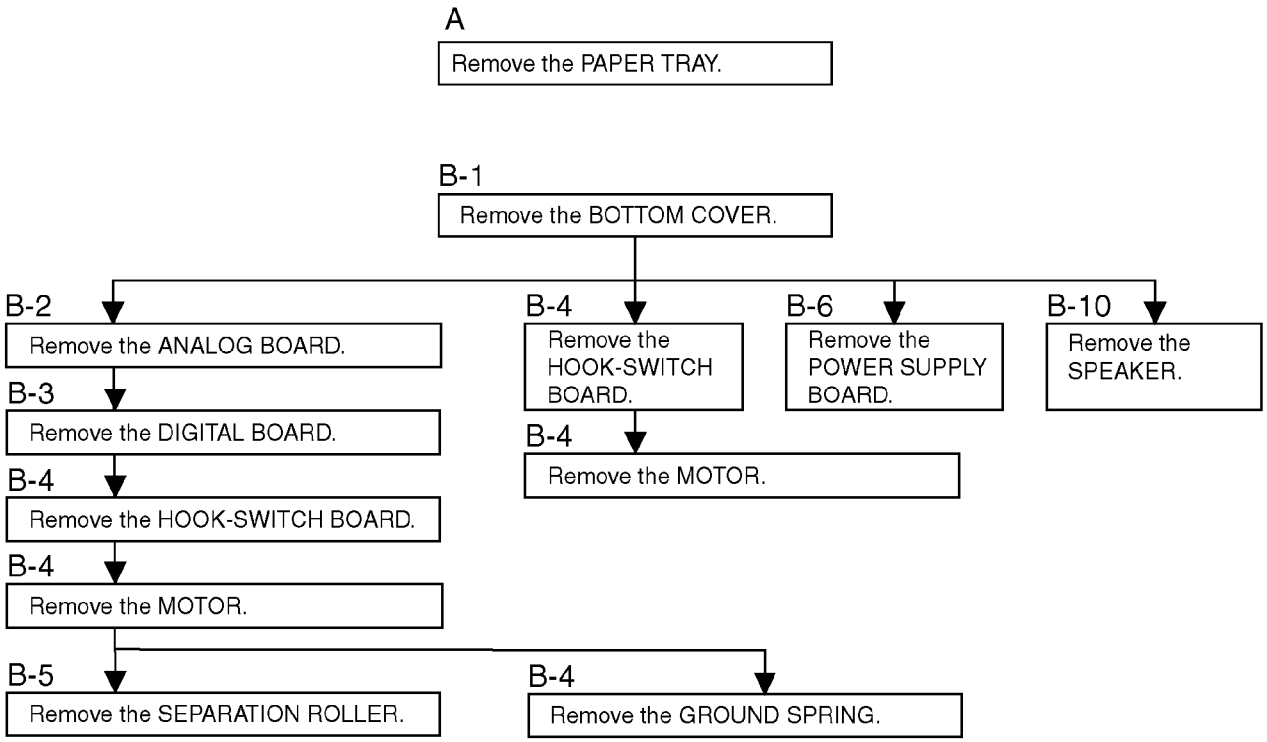
10. Install the paper tray (
), then insert the recording paper (
).

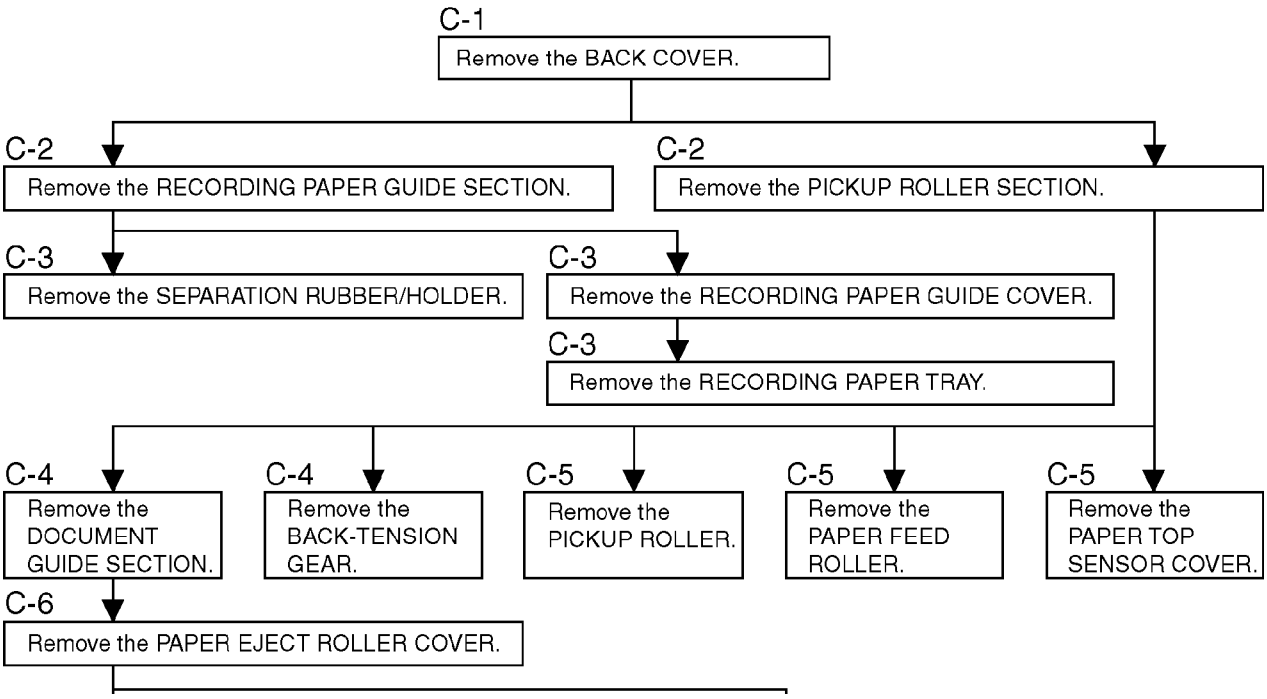
5. DISASSEMBLY INSTRUCTIONS

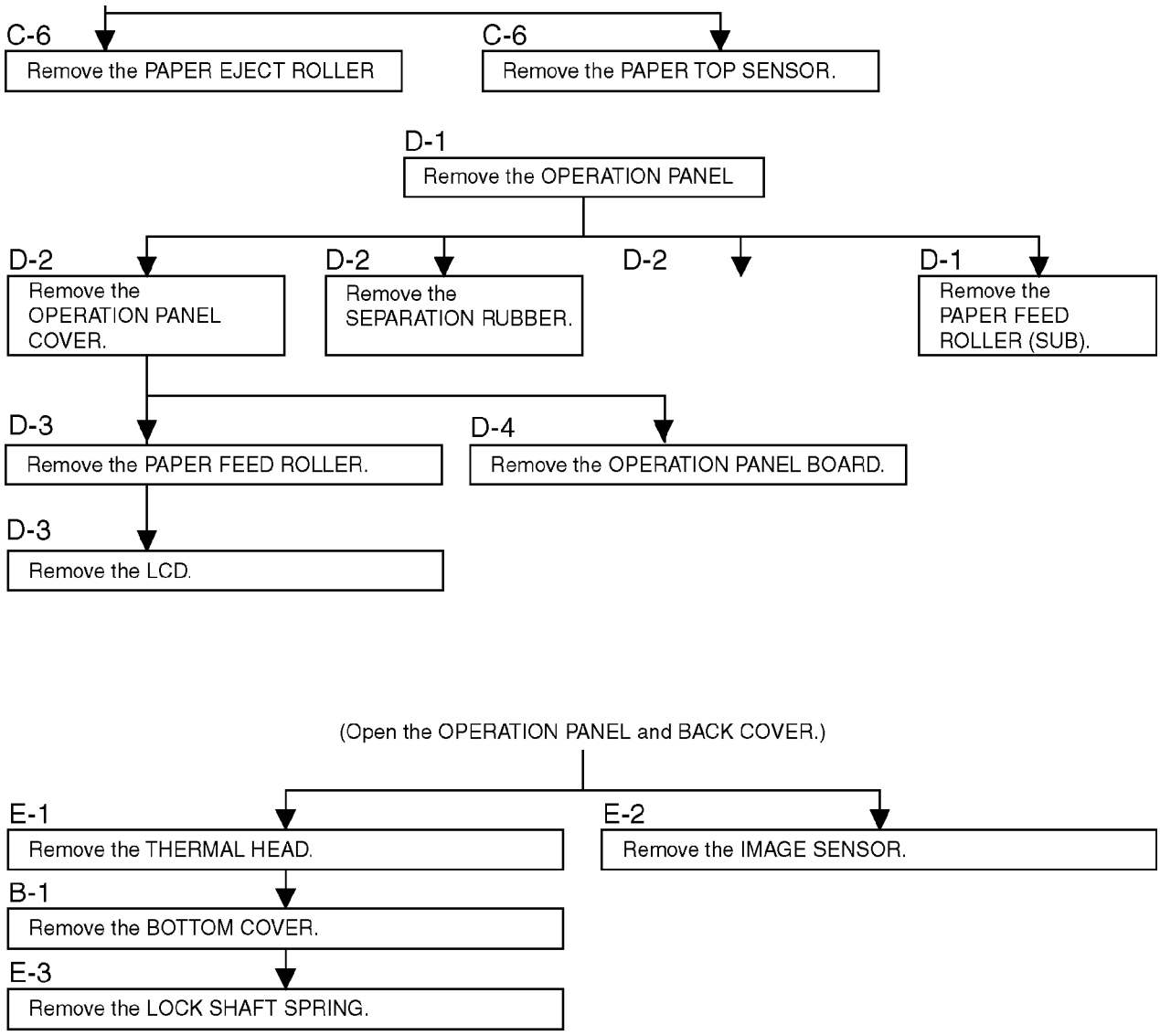
5.1. GENERAL SECTION


C-SECTION
D-SECTION
B-SECTION
(BOARDs, MOTOR, SPEAKER, etc.)
E-SECTION
(THERMAL HEAD, IMAGE SENSOR)

5.2. DISASSEMBLY FLOW CHART


A
Remove the PAPER TRAY.
B-1
Remove the BOTTOM COVER.
B-2
Remove the ANALOG BOARD.
B-3
Remove the DIGITAL BOARD.
B-4
Remove the HOOK-SWITCH BOARD.
B-4
Remove the MOTOR.
B-5
Remove the SEPARATION ROLLER.
B-4
Remove the HOOK-SWITCH BOARD.
B-4
Remove the MOTOR.
B-4
Remove the GROUND SPRING.
B-6
Remove the POWER SUPPLY BOARD.
B-10
Remove the SPEAKER.


C-1
Remove the BACK COVER.
C-2
Remove the RECORDING PAPER GUIDE SECTION.
C-2
Remove the PICKUP ROLLER SECTION.
C-3
Remove the SEPARATION RUBBER/HOLDER.
C-3
Remove the RECORDING PAPER GUIDE COVER.
C-3
Remove the RECORDING PAPER TRAY.
C-4
Remove the DOCUMENT GUIDE SECTION.
C-4
Remove the BACK-TENSION GEAR.
C-5
Remove the PICKUP ROLLER.
C-5
Remove the PAPER FEED ROLLER.
C-5
Remove the PAPER TOP SENSOR COVER.
C-6
Remove the PAPER EJECT ROLLER COVER.

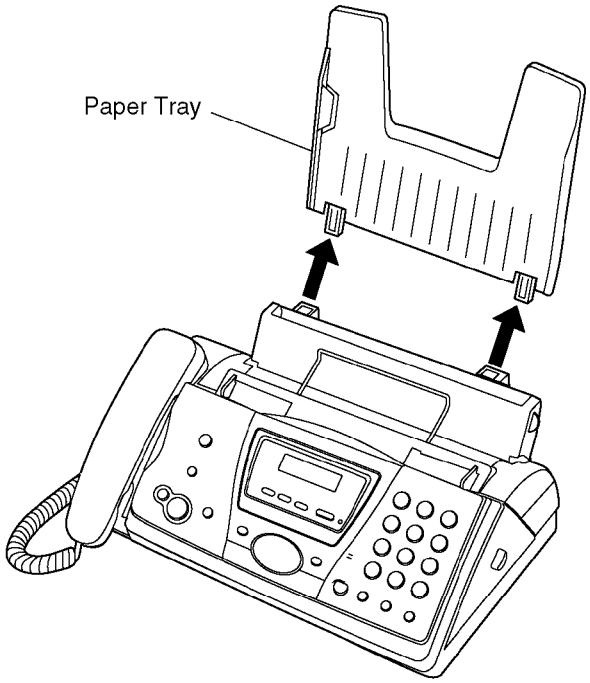


5.3. How to Remove the PAPER TRAY

Procedure: A

Ref No. A

(1) Remove the Paper Tray.

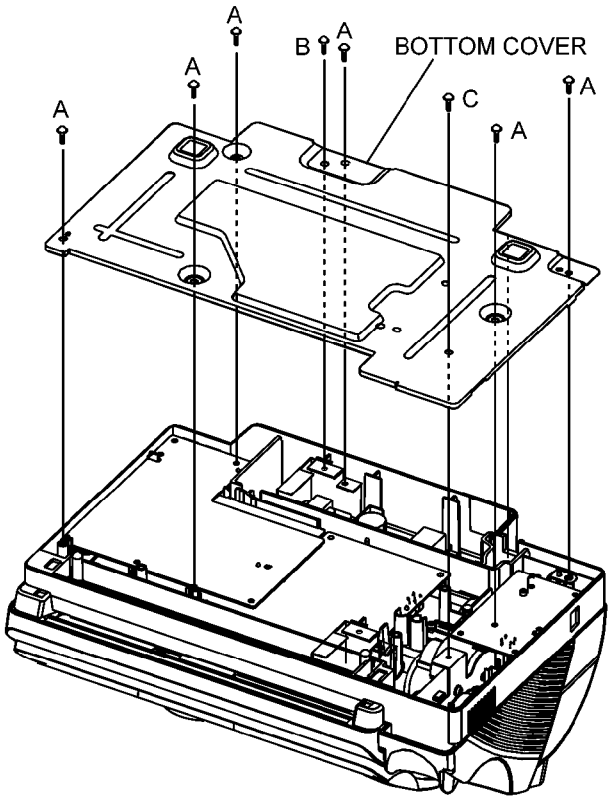


5.4. Remove the BOTTOM COVER

Procedure: B-1

Ref No. B-1

(1) Remove the 6 screws A, 1 screw B, and 1 screw C.
(2) Remove the BOTTOM COVER .

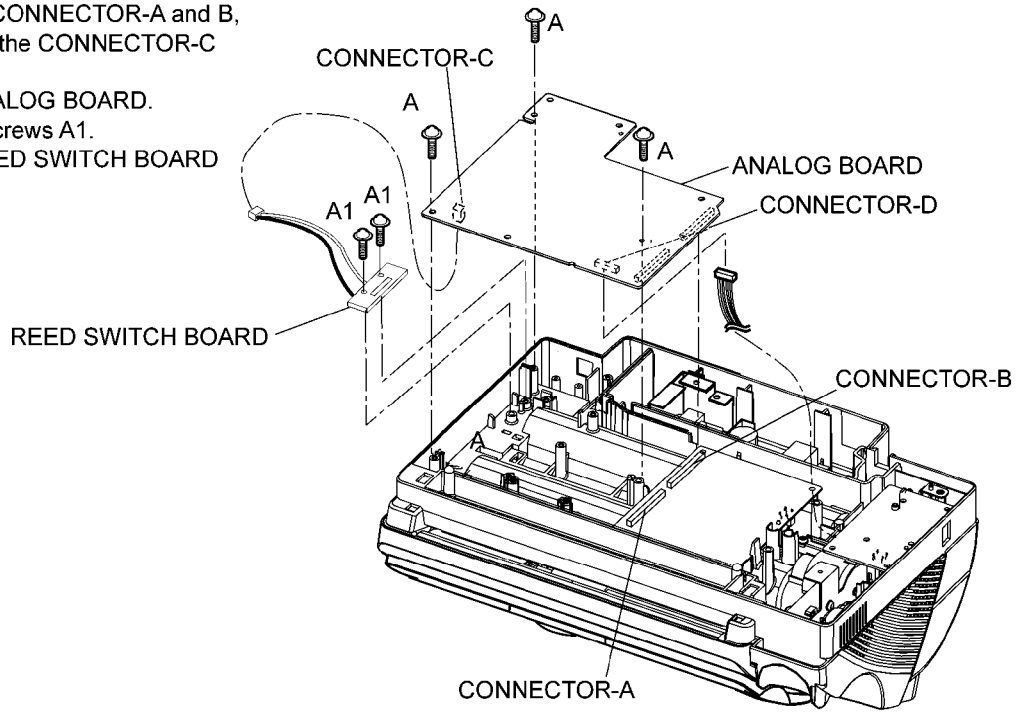


5.5. How to Remove the ANALOG BOARD

Procedure: B-1-->B-2

Ref No. B-2

(1) Remove the 3 screws A.
(2) Disconnect the CONNECTOR-A and B, then disconnect the CONNECTOR-C and D.
Remove the ANALOG BOARD.
(3) Remove the 2 screws A1.
(4) Remove the REED SWITCH BOARD

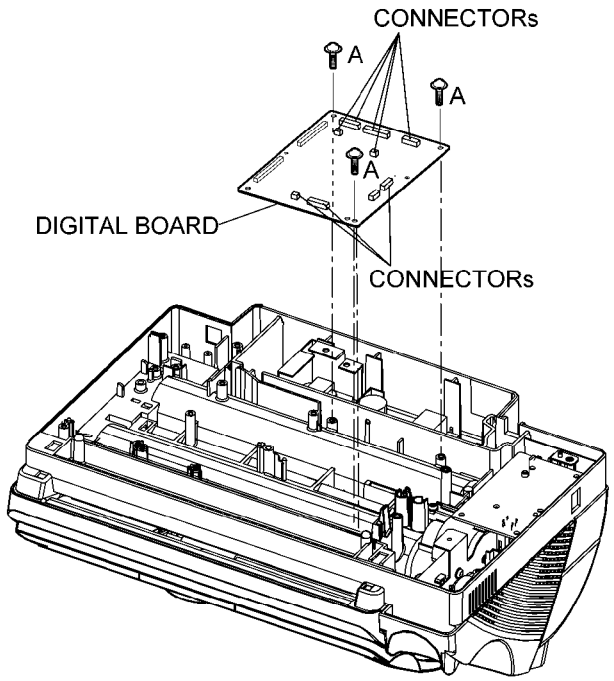


5.6. How to Remove the DIGITAL BOARD

Procedure: B-1-->B-2-->B-3

Ref No. B-3

(1) Disconnect the 8 CONNECTORs on the BOARD.
(2) Remove the 3 screws A.
(3) Remove the DIGITAL BOARD.



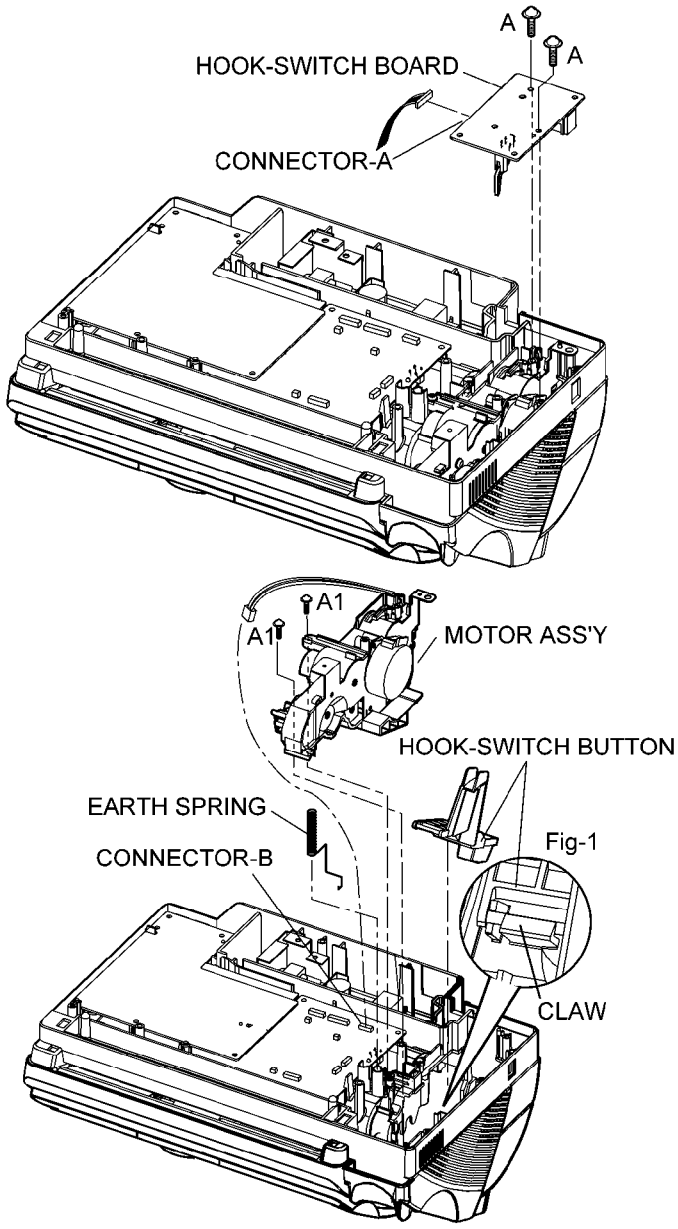
5.7. How to Remove the HOOK-SWITCH BOARD

Procedure: B-1-->B-4

Ref No. B-4

HOOK SWITCH BOARD
(1) Remove the 2 screws A, then disconnect the CONNECTOR-A.
(2) Remove the HOOK-SWITCH BOARD.

MOTOR ASS'Y
(1) Remove the 2 screws A1.
(2) Disconnect the CONNECTOR-B.
(3) Remove the MOTOR ASS'Y.
(4) Release the CLAW, then remove the HOOK-SWITCH BUTTON. (Fig-1)
(5) Remove the EARTH SPRING.



5.8. How to Remove the SEPARATION ROLLER

Procedure: B-1-->B-2-->B-3-->B-4-->B-5

Ref No. B-5

(1) Remove the SEPARATION GEAR by lifting its GEAR side up a little in the direction of ① as illustrated in Fig-1 and then pulling it up in the direction of ②.
(2) Remove the SEPARATION ROLLER.

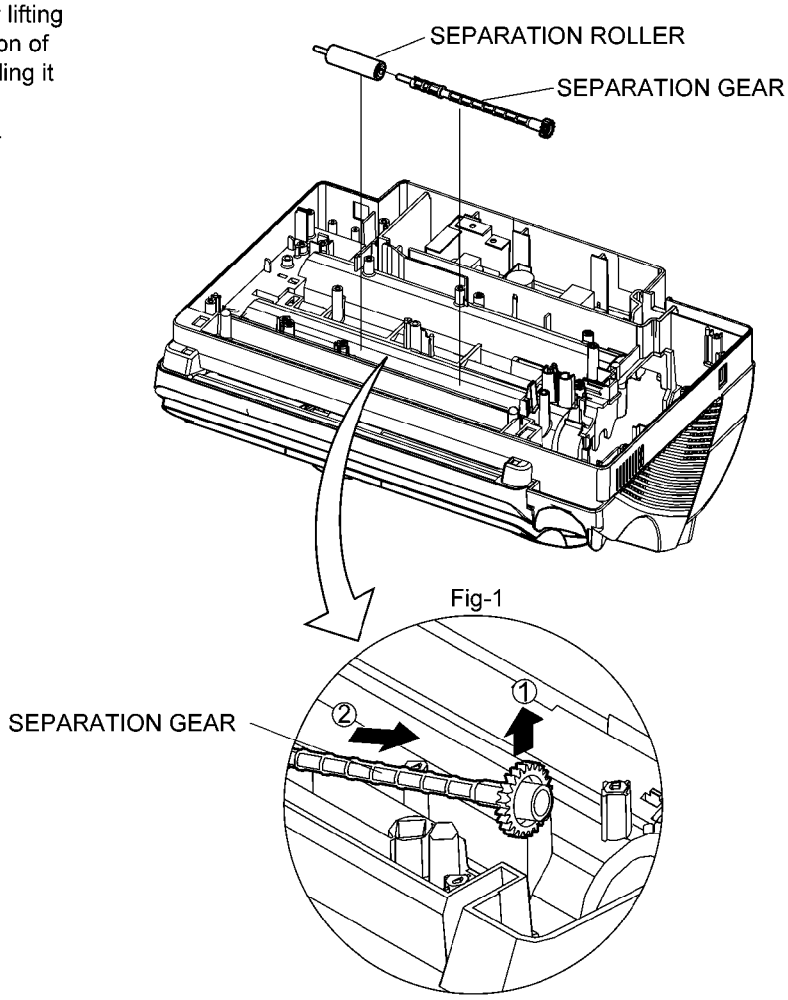


Fig-1

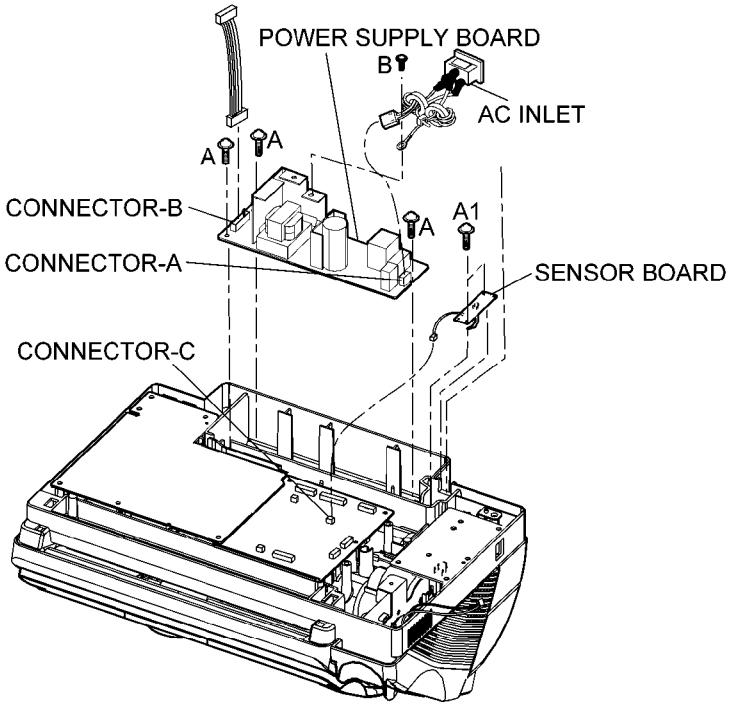
5.9. How to Remove the POWER SUPPLY BOARD

Procedure: B-1-->B-6

Ref No. B-6

POWER SUPPLY BOARD
(1) Disconnect the CONNECTOR-A and CONNECTOR-B.
(2) Remove the 1 screw B and 3 screws A.
(3) Remove the POWER SUPPLY BOARD.

SENSOR BOARD
(1) Disconnect the CONNECTOR-C.
(2) Remove the 2 screws A1.
(3) Remove the SENSOR BOARD.

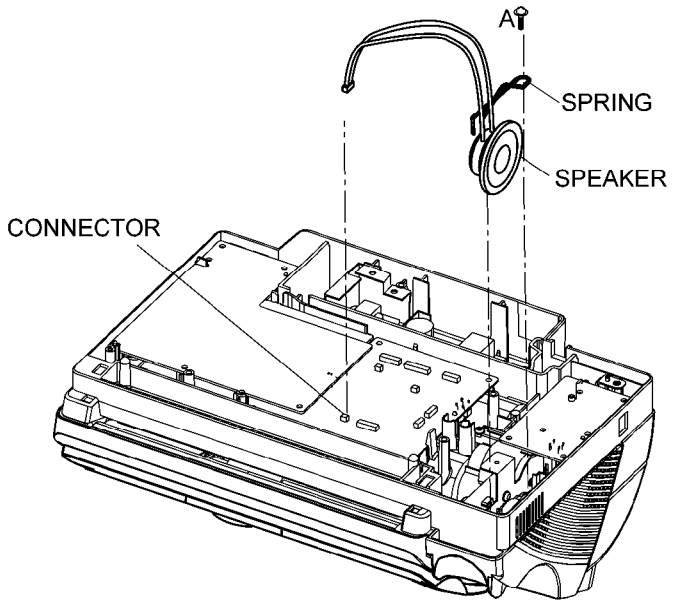


5.10. How to Remove the SPEAKER

Procedure: B-1-->B-10

Ref No. B-10

(1) Remove the 1 screw A.
(2) Remove the SPRING.
(3) Disconnect the CONNECTOR.
(4) Remove the SPEAKER.

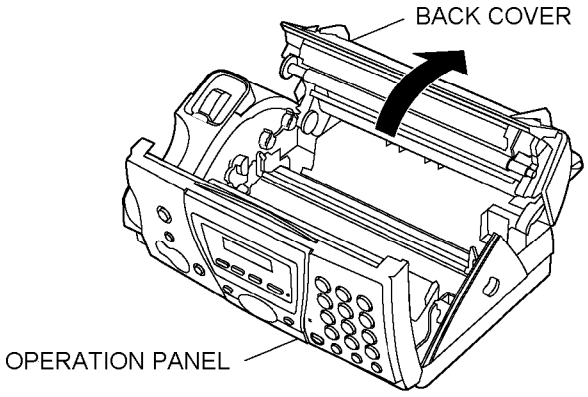


5.11. How to Remove the BACK COVER

Procedure: C-1

Ref No. C-1

(1) Open the OPERATION PANEL and BACK COVER.
(2) Release the hook as illustrated in Fig-1, and then remove the BACK COVER.



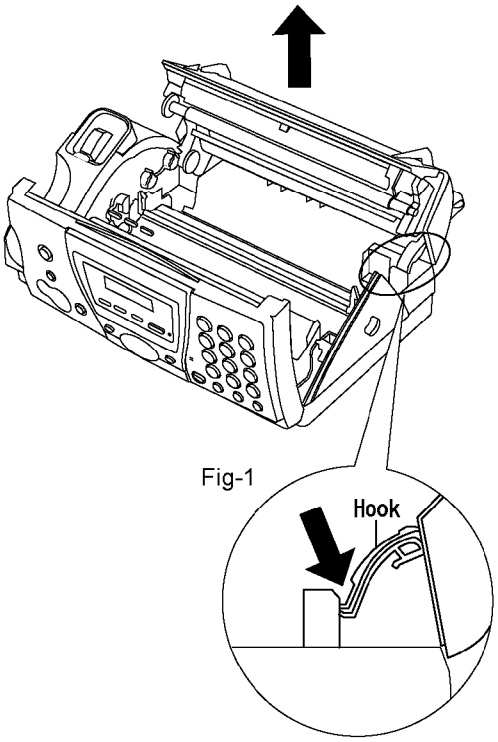


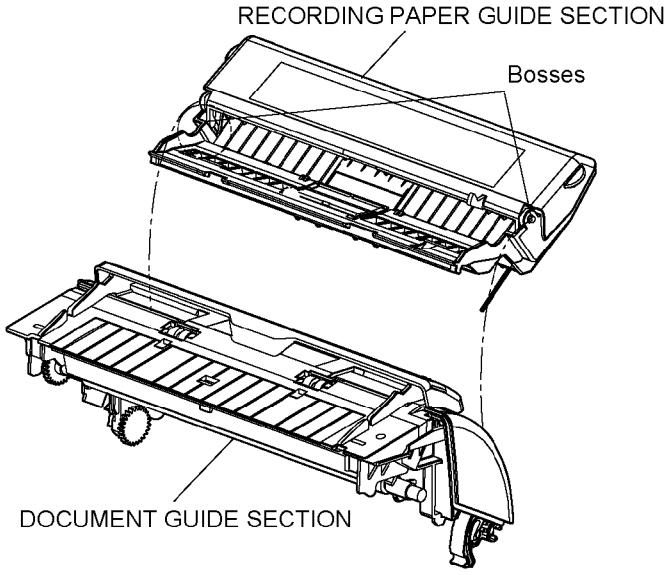
Fig-1

5.12. How to Remove the RECORDING PAPER GUIDE SECTION

Procedure: C-1-->C-2

Ref No. C-2

(1) Release the 2 bosses, and then remove the RECORDING PAPER GUIDE SECTION and DOCUMENT GUIDE SECTION.

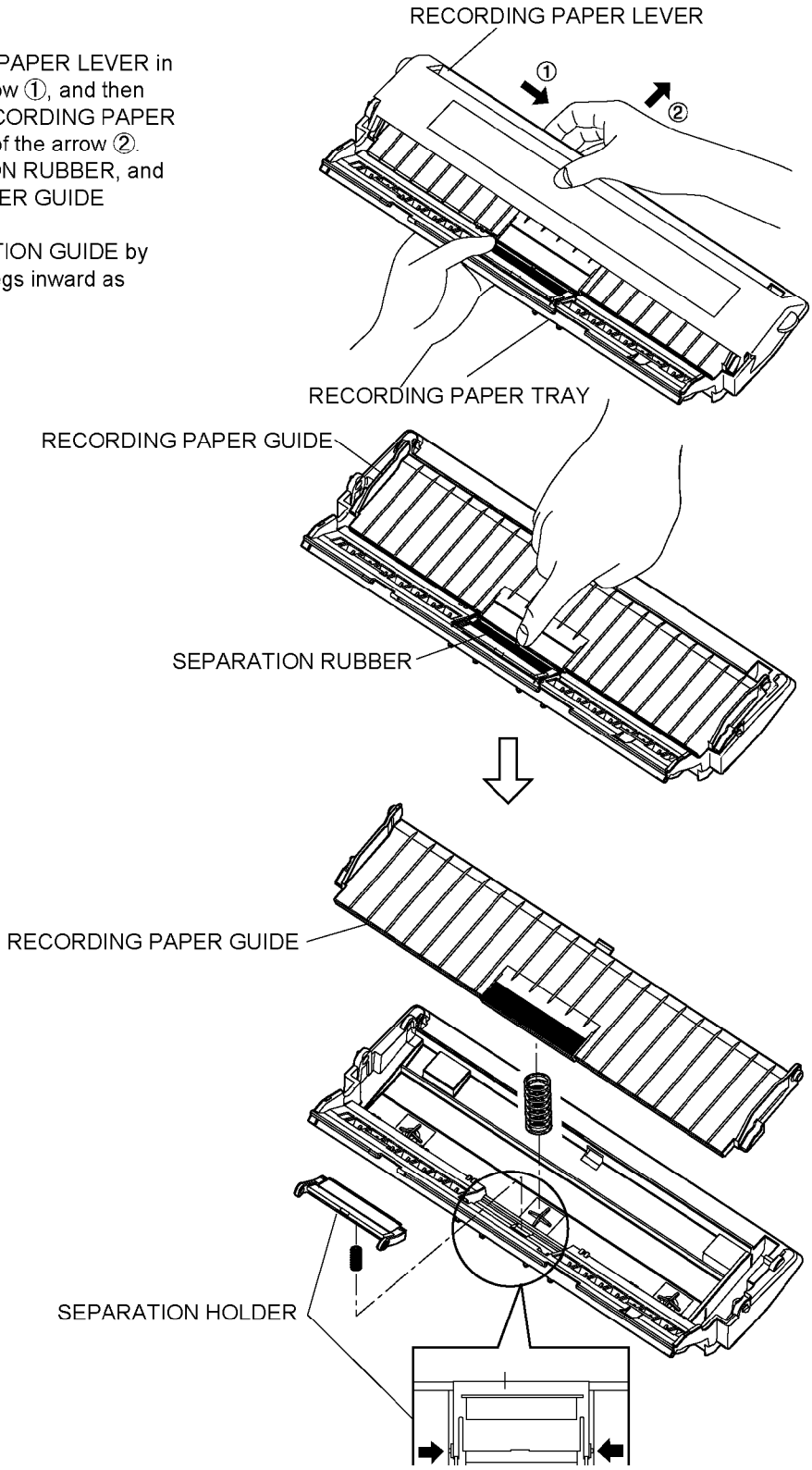


5.13. How to Remove the SEPARATION RUBBER/HOLDER

Procedure: C-1-->C-2-->C-3

Ref No. C-3

(1) Pull the RECORDING PAPER LEVER in the direction of the arrow ①, and then remove it from the RECORDING PAPER TRAY in the direction of the arrow ②.
(2) Press the SEPARATION RUBBER, and the RECORDING PAPER GUIDE becomes detached.
(3) Remove the SEPARATION GUIDE by pushing its both-side legs inward as illustrated in Fig-1.



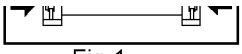


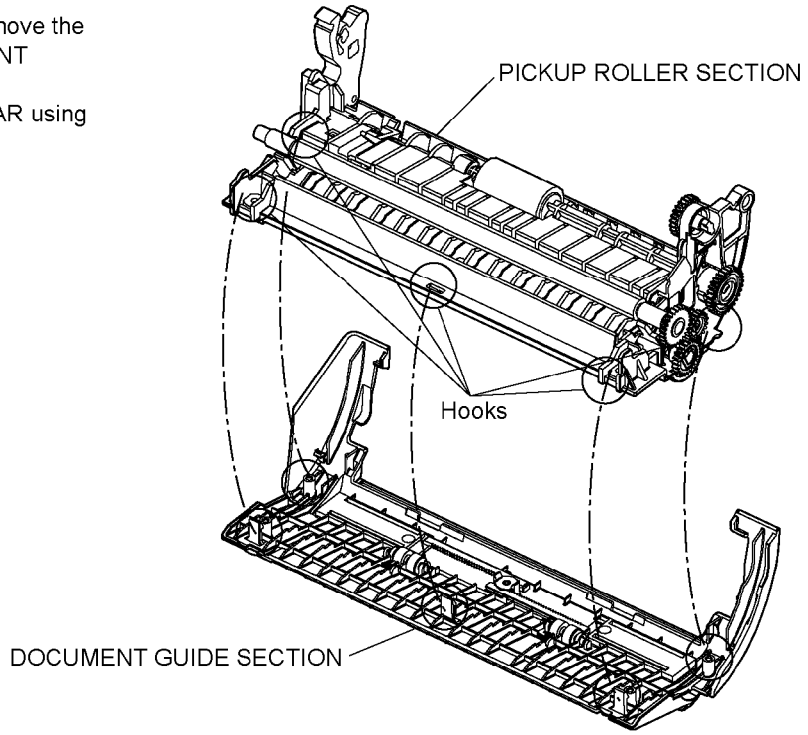
Fig-1

5.14. How to Remove the DOCUMENT GUIDE SECTION

Procedure: C-1-->C-2-->C-4

Ref No. C-4

(1) Release the 5 hooks, and then remove the PICKUP SECTION and DOCUMENT GUIDE SECTION.
(2) Remove the BACK-TENSION GEAR using the steps illustrated in Fig-1.



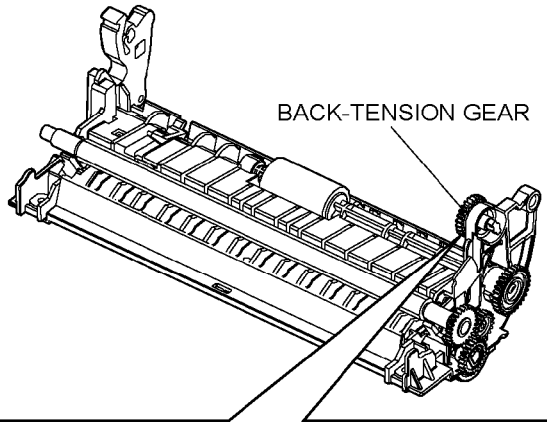
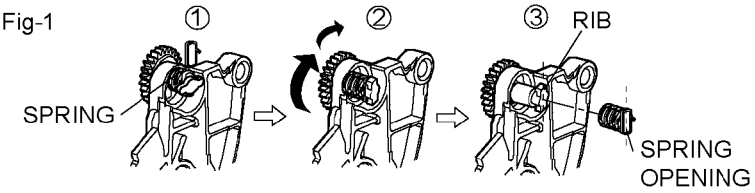


Fig-1



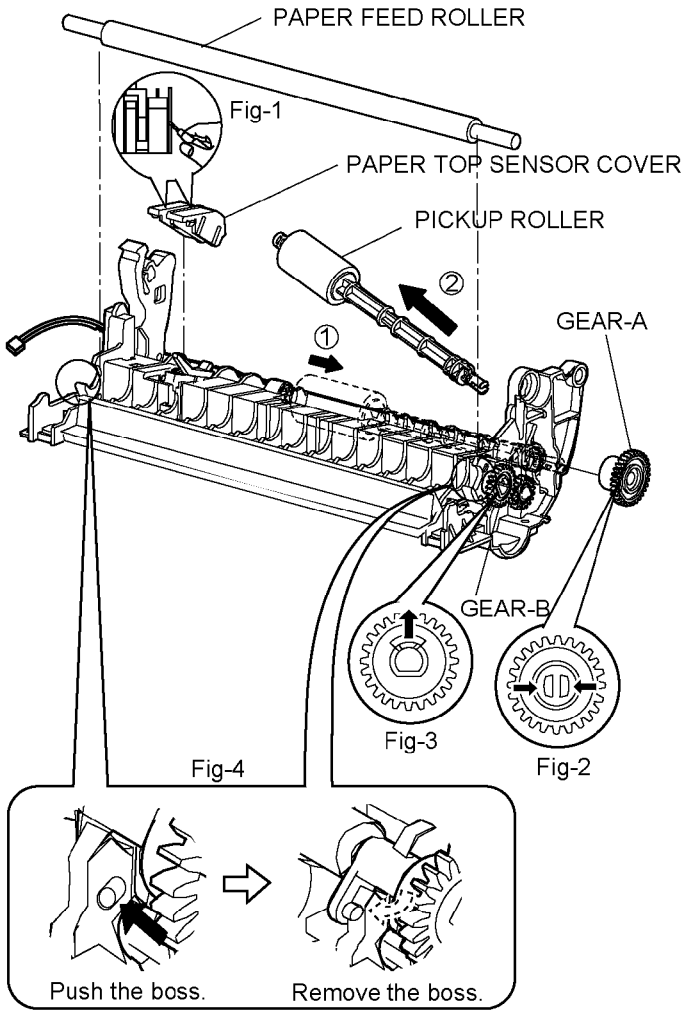
① Hold the SPRING with a hand so that it will not move.
② Turn the GEAR in the direction of the arrow until both the RIB on the GEAR and the SPRING OPENING face the same direction (see ③).
③ Remove the SPRING from the GEAR.

5.15. How to Remove the PICKUP ROLLER AND PAPER FEED ROLLER

Procedure: C-1-->C-2-->C-5

Ref No. C-5

(1) Push the leg of the PAPER TOP SENSOR COVER inward as illustrated in Fig-1 to release the hooks, and then remove the COVER.
(2) Remove the GEAR-A by pushing the hooks inward as illustrated in Fig-2.
(3) Slightly push the PICK UP ROLLER in the direction of the arrow ① to release it. After that, remove it by pulling it up in the direction of the arrow ②.
(4) Remove the GEAR-B by pushing the hook outward as illustrated in Fig-3.
(5) Release the spacers located on both the sides of the PAPER FEED ROLLER using the steps illustrated in Fig-4.
(6) Remove the PAPER FEED ROLLER.

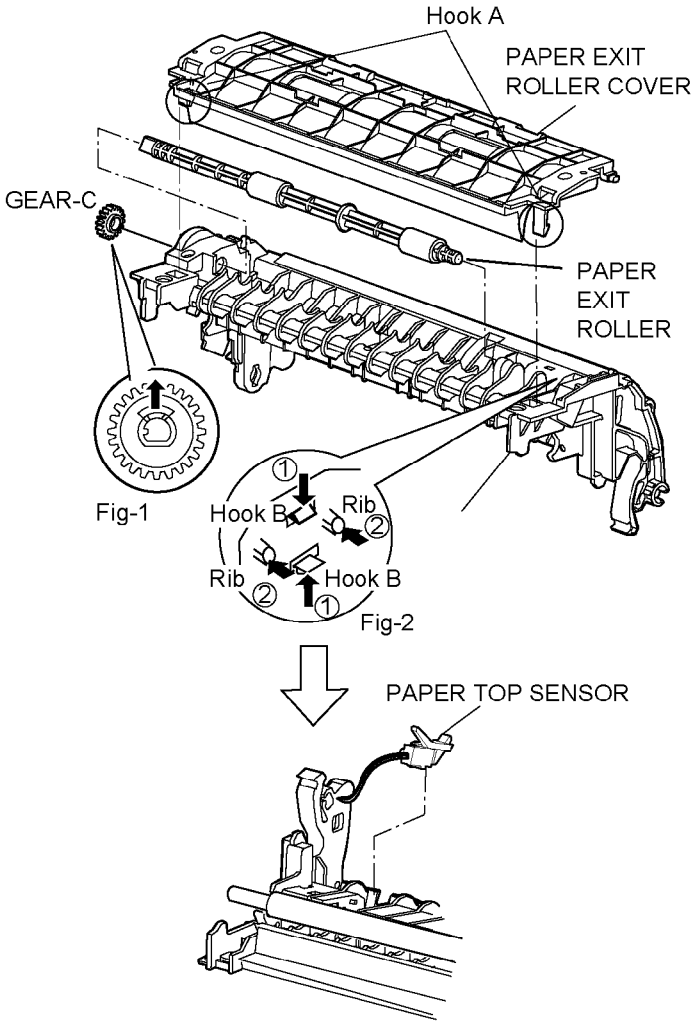


5.16. How to Remove the PAPER EXIT ROLLER

Procedure: C-1-->C-2-->C-4-->C-6

Ref No. C-6

(1) Release the 2 Hooks A, then remove the PAPER EXIT ROLLER COVER.
(2) Remove the GEAR-C by pushing the hook outward as illustrated in Fig-1.
(3) Remove the PAPER EXIT ROLLER.
(4) Remove the PAPER TOP SENSOR by pushing the Hooks B ① inward and pushing the Ribs ② in the direction of the arrows as illustrated in Fig-2.



5.17. How to Remove the OPERATION PANEL

Procedure: D-1

Ref No. D-1

(1) Open the OPERATION PANEL.
(2) Release the hooks as illustrated in Fig-1, and then remove the OPERATION PANEL from the main body.
(3) Slightly slide the PAPER FEED ROLLER (SUB) to the right side, and then remove it from the left side.

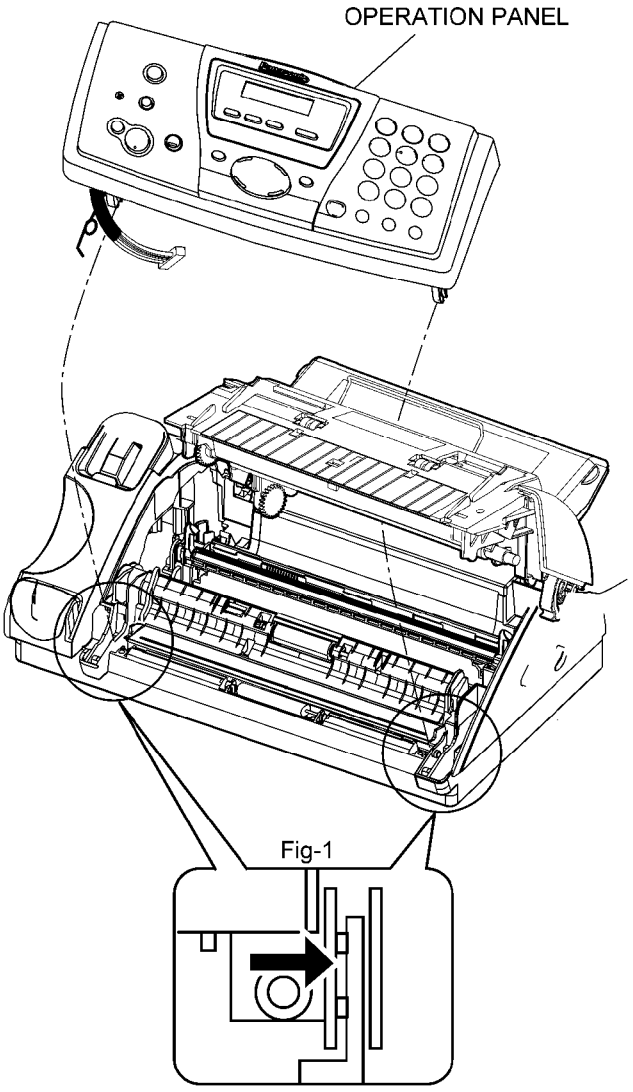
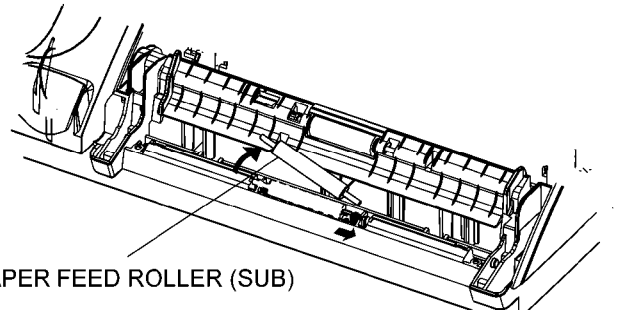


Fig-1



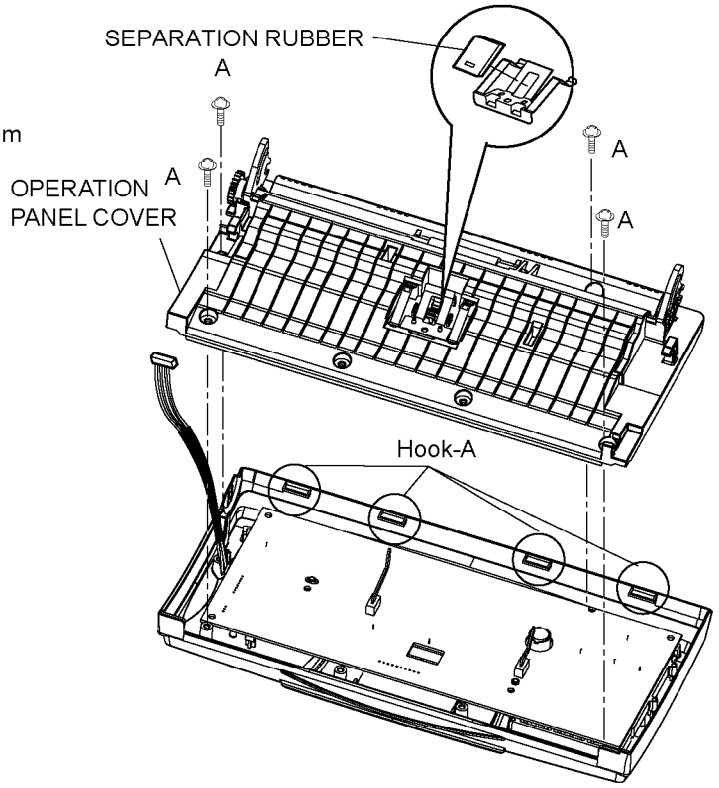
5.18. How to Remove the OPERATION PANEL COVER

Procedure: D-1-->D-2

Ref No. D-2

SEPARATION RUBBUR
(1) Remove the SEPARATION RUBBER from the PLATE.

OPERATION PANEL COVER
(1) Remove the 4 screws A.
(2) Release the 4 Hook-As.
(3) Remove the OPERATION PANEL COVER.



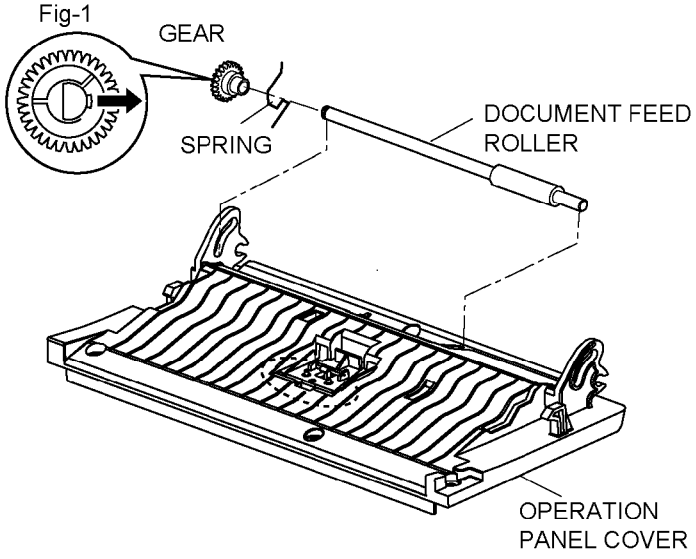
5.19. How to Remove the DOCUMENT FEED ROLLER

Procedure: D-1-->D-2-->D-3

Ref No. D-3

(1) Release the GEAR as illustratd in Fig-1, then remove the DOCUMENT FEED ROLLER and SPRING.

Fig-1

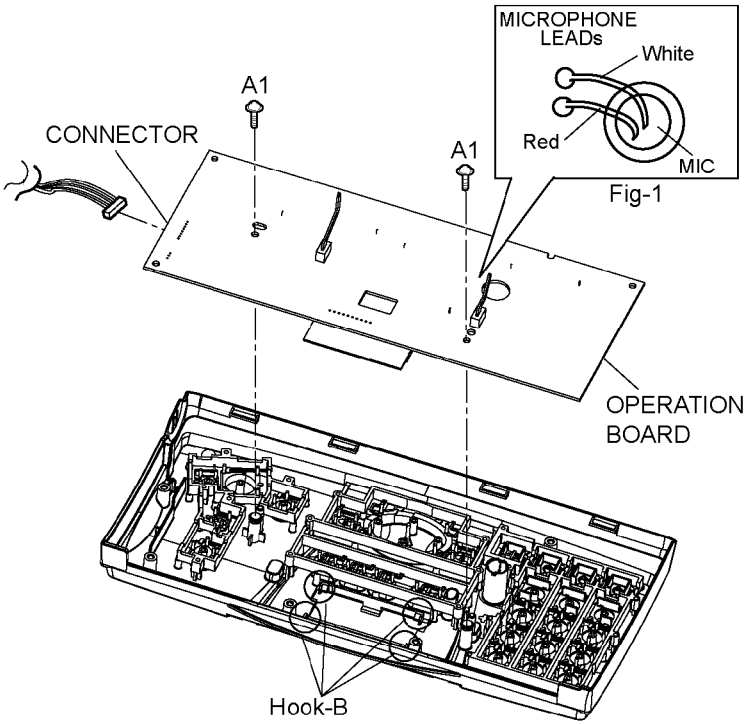


5.20. How to Remove the OPERATION PANEL BOARD

Procedure: D-1-->D-2-->D-4

Ref No. D-4

(1) Remove the 2 screws A1.
(2) Disjoin the solder joins of the MICRO-LEADs, then remove the MIC (Fig-1).
(3) Release the 4 Hook-Bs .
(4) Remove the CONNECTOR.
(5) Remove the OPERATION BOARD

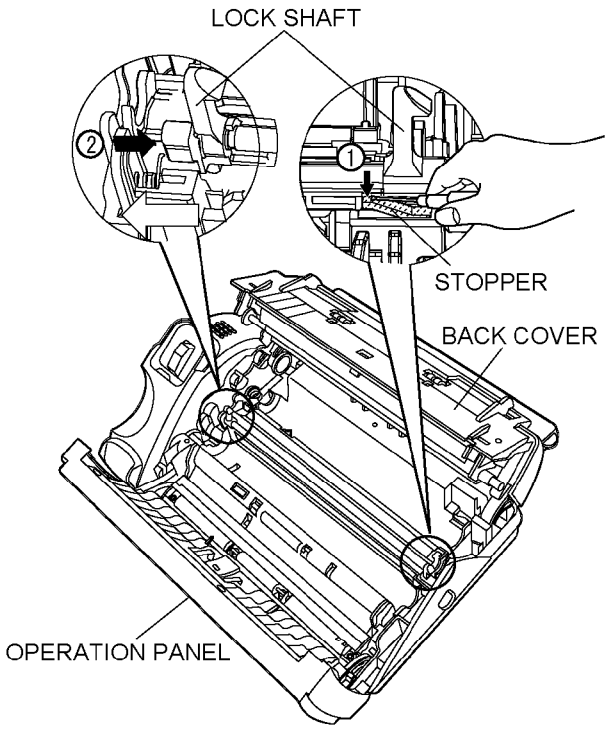


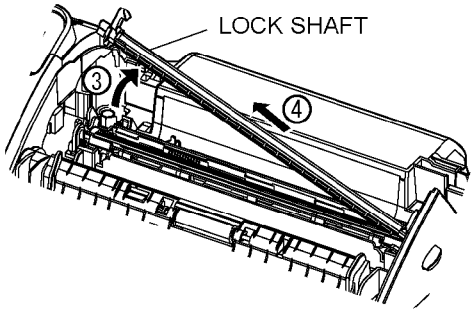
5.21. How to Remove the THERMAL HEAD

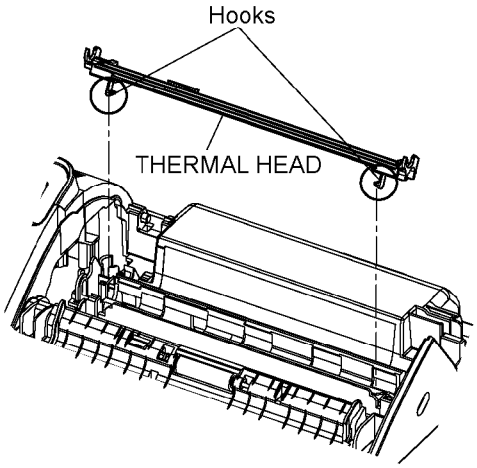
Procedure: E-1

Ref No. E-1

(1) Open the OPERATION PANEL and BACK COVER.
(2) Remove the LOCK SHAFT, as illustrated, by lowering the STOPPER ①, pushing the SHAFT in the direction of the arrow ②, lifting it up in the direction of ③, and pulling it up in the direction of ④.
(3) Release the both-side chooks of the THERMAL HEAD from the main body.
(4) Remove the THERMAL HEAD.







5.22. How to Remove the IMAGE SENSOR

Procedure: E-2

Ref No. E-2

(1) Open the OPERATION PANEL and BACK COVER.
(2) Disengage the IMAGE SENSOR by pushing the hooks as illustrated in Fig-1.
(3) Remove the IMAGE SENSOR from the CABINET BODY, then disconnect the CONNECTOR-A.
(4) Remove the IMAGE SENSOR.

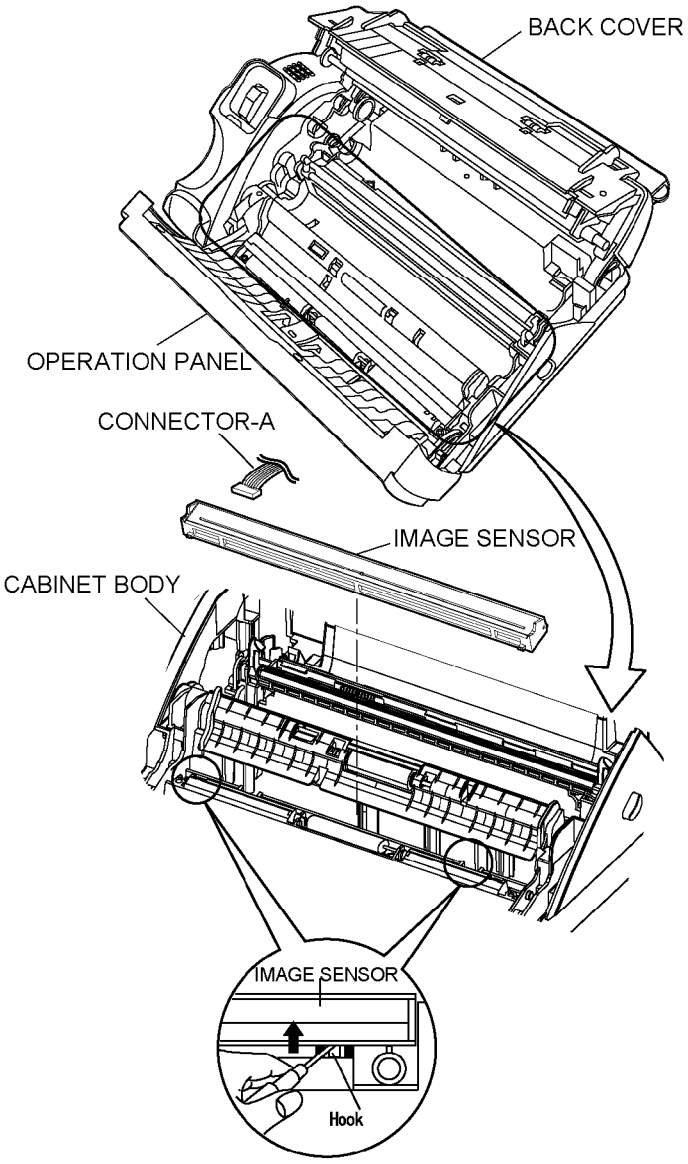


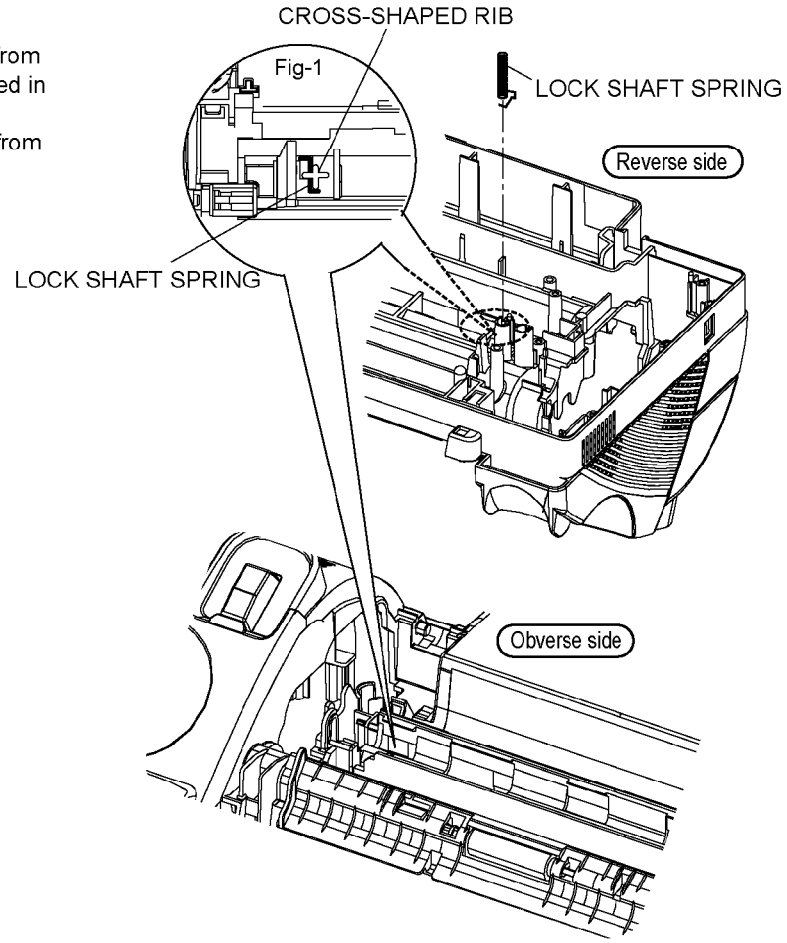
Fig-1

5.23. How to Remove the LOCK SHAFT SPRING

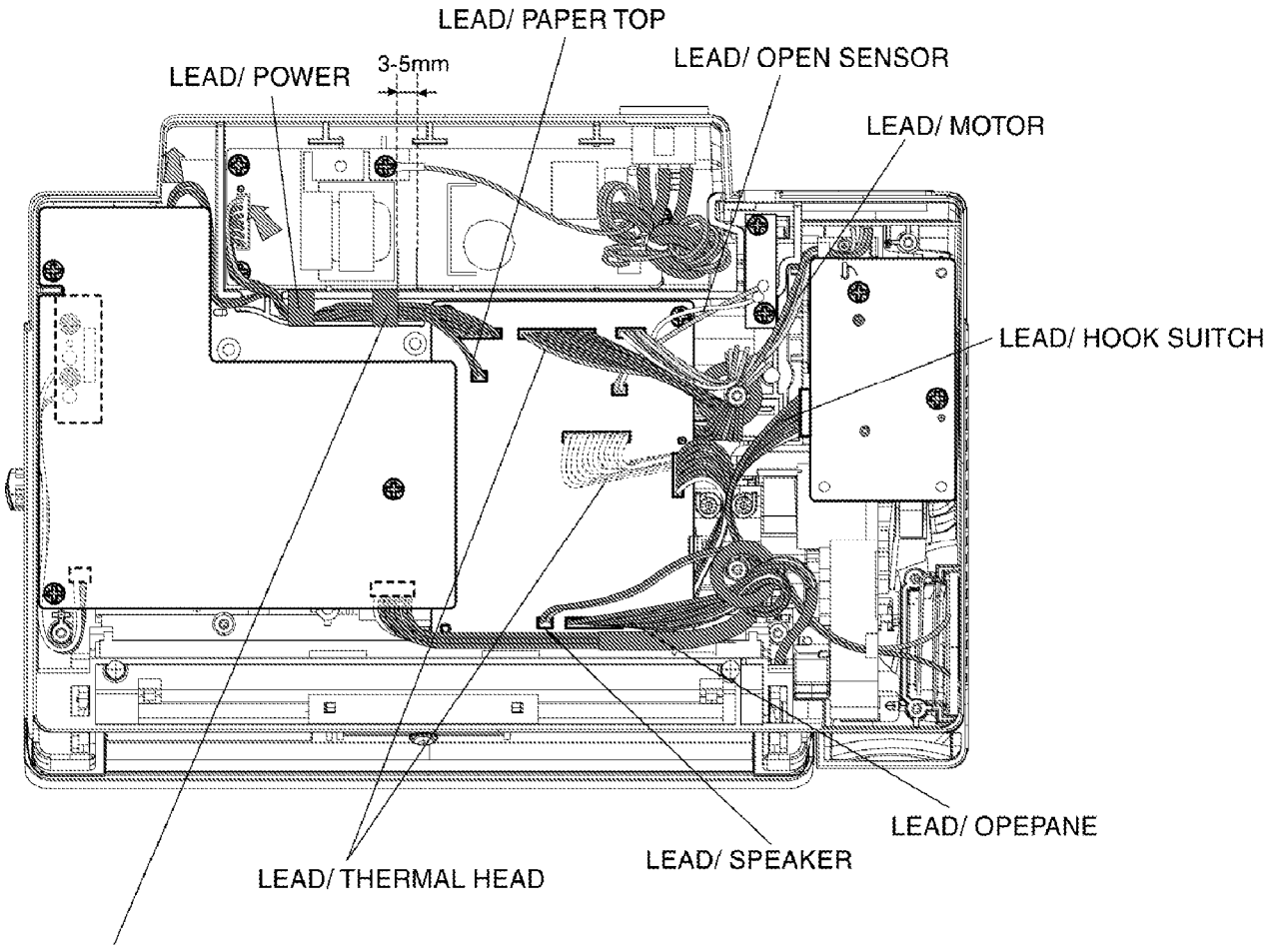
Procedure: E-1-->B-1-->E-3

Ref No. E-3

(1) Release the LOCK SHAFT SPRING from the CROSS-SHAPED RIB as illustrated in Fig-1. (Obverse side)
(2) Remove the LOCK SHAFT SPRING from the reverse side with the BOTTOM COVER removed.



5.24. INSTALLATION POSITION OF THE LEAD



After processing the wires of LEAD/POWER, fix them to the main cabinet with tape 3~5 mm away from the rib as shown in the figure.

6. TROUBLESHOOTING GUIDE

6.1. TROUBLESHOOTING SUMMARY

6.1.1. TROUBLESHOOTING

After confirming the problem by asking the user, troubleshoot according to the instructions and observe the following precautions.

6.1.2. PRECAUTIONS

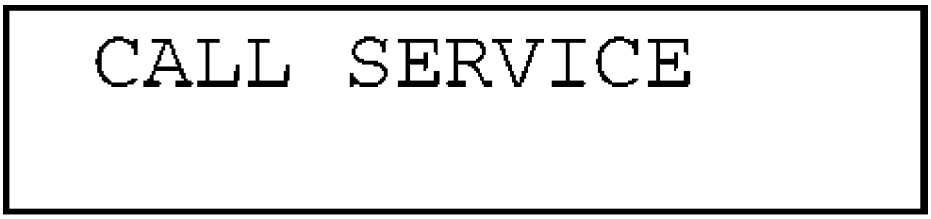
1. **If there is a problem with the print quality or the paper feed, first check if the installation space and the print paper meets the specifications, the paper selection lever/paper thickness lever is set correctly, and the paper is set correctly without any slack.**
2. **Before troubleshooting, first check that the connectors and cables are connected correctly (not loose).**
   If the problem occurs randomly, check it very carefully.
3. **When connecting the AC power cord with the unit and checking the operation, exercise utmost care when handling electric parts in order to avoid electric shocks and short-circuits.**
4. **After troubleshooting, double check that you have not forgotten any connectors, left any loose screws, etc.**
5. **Always test to verify that the unit is working normally.**

6.1.3. WHEN YOU DON'T KNOW HOW TO OPERATE THE UNIT, USE THE HELP FUNCTION

- **How to use:**
  1. **press** HELP.
  2. **press** ◄ **or** ► **until the desired item is displayed.**
  3. **press** SET.

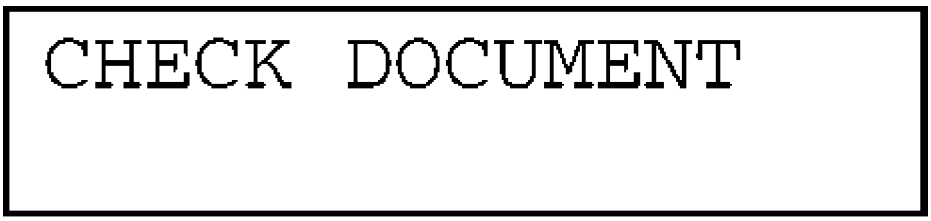
6.2. USER RECOVERABLE ERRORS

If the unit detects a problem, one or more of the following messages will appear on the display.
The explanations given in the [ ] are for servicemen only.

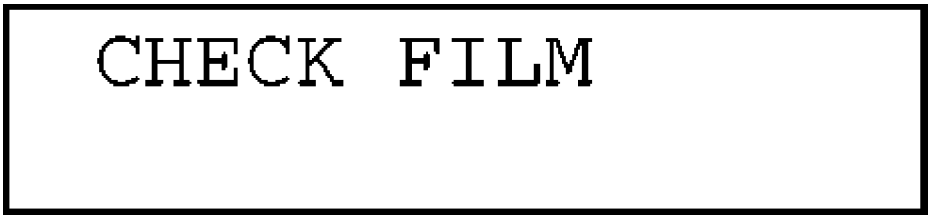


- **There is something wrong with the unit.**
  [This error is displayed when the thermal head does not warm up. Check the thermistor on the thermal head and connector lead.]

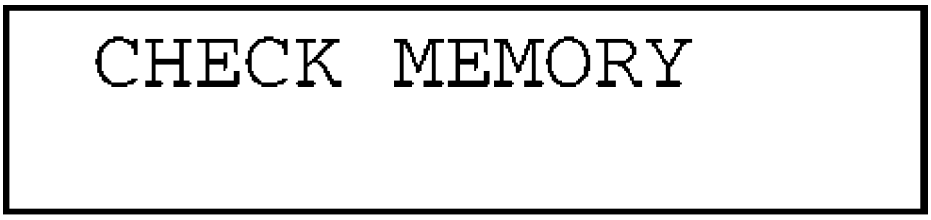
- **This message appears when the gear is not in an idle state. Check the GEAR BLOCK and Handset JACK UNIT.**
  (Refer to GEAR SECTION (
).)



- **The document was not fed into the unit properly. Re-insert the document. If misfeeding occurs frequently, clean the document feeder rollers and try again.**
  (Refer to How to Remove the PICKUP ROLLER AND PAPER FEED ROLLER (
).)
- **Attempted to transmit a document longer than 600 mm. Press [STOP] to remove the document. Divide the document into two or more sheets and try again.**
  [Alternately, turn off service code #559 to enable sending of documents longer than 600 mm] (Refer to SERVICE FUNCTION TABLE (
).)



- **The ink film is empty. Replace the ink film with a new one. (Refer to Replacing the ink film ( ).)**
- **The ink film is not installed. Install it. (Refer to Installing the ink film ( ).)**
- **The ink film is slack or creased. Tighten it. (Refer to Installing the ink film ( ).)**

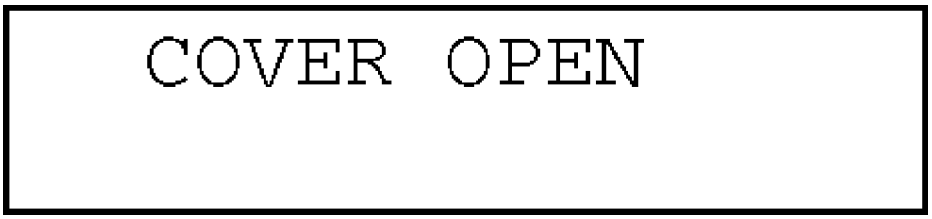


- **The memory (telephone numbers, parameters, etc.) has been erased. Re-program.**

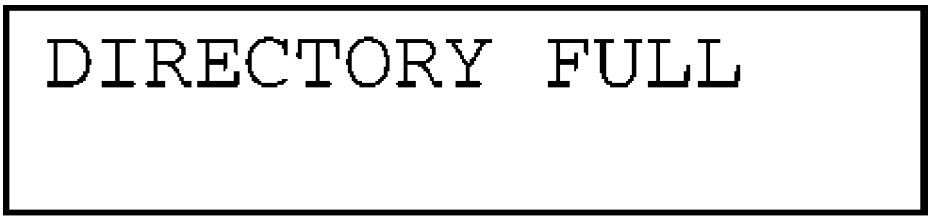
- **The recording paper is not installed or the unit has run out of paper. Install paper and press [START] to clear the message.**
- **The recording paper was not fed into the unit properly. (Refer to INSTALLING THE RECORDING PAPER ( ).) Reinstall paper and press [START] to clear the message. (Refer to INSTALLING THE RECORDING PAPER ( ).)**
- **The recording paper has jammed near the recording paper entrance. Clear the jammed paper and press [SET] to clear the message. (Refer to RECORDING PAPER JAMS (**

).)

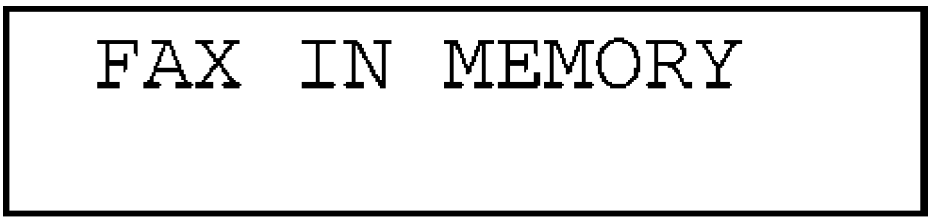
- **The tension plate is open. Close it.**



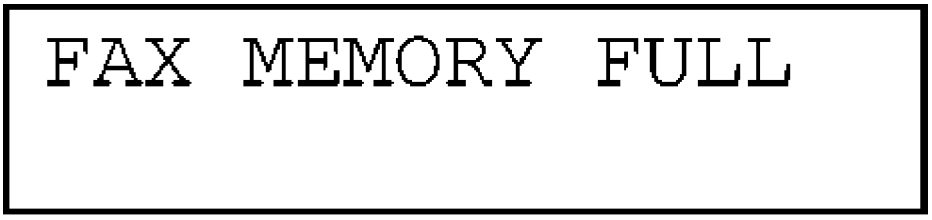
- **The cover is open. Close them.**



- **There is no space to store new items in navigator directory. Erase unnecessary items.**

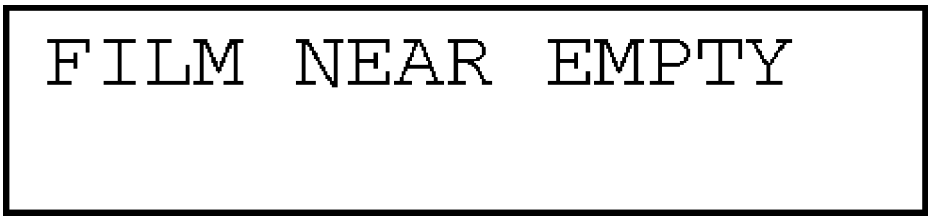


- **The unit has a document in memory. See the other displayed message instructions to print out the document.**

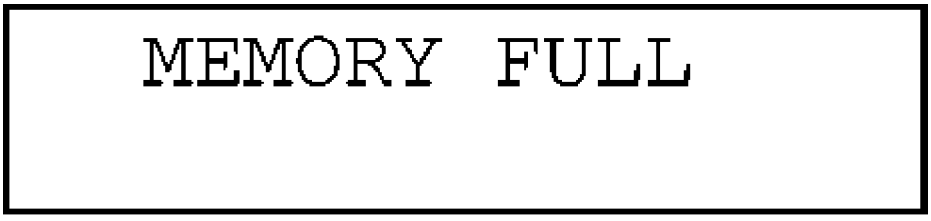


- **The memory is full of received documents due to lack of recording paper or a recording paper jam. Install paper or clear the jammed paper. (Refer to INSTALLING THE RECORDING PAPER ( ) and RECORDING PAPER JAMS ( ).)**
- **When performing memory transmission, the document being stored exceeds the memory capacity of the unit. Transmit the entire document manually.**

- **The ink film is empty. Replace the ink film with a new one.**
- **The ink film is slack. Tighten it and install again.**
- **The fax machine is positioned near appliances such as TVs or speakers which generate an intense magnetic field.**

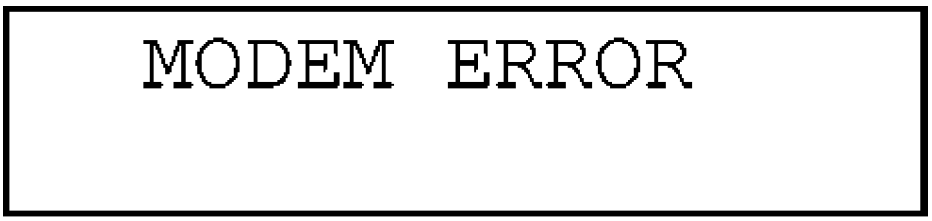


- **The remaining ink film is low. Prepare a new ink film.**



- **When making a copy, the document being stored exceeds the memory capacity of the unit. Press [STOP] to clear the message. Divide the document into sections.**

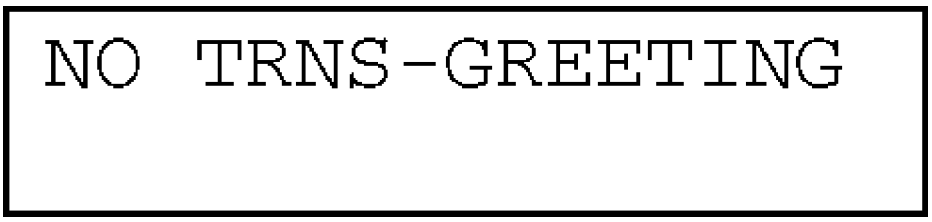
- **There is no room left in memory to record a voice message. Erase unnecessary messages.**



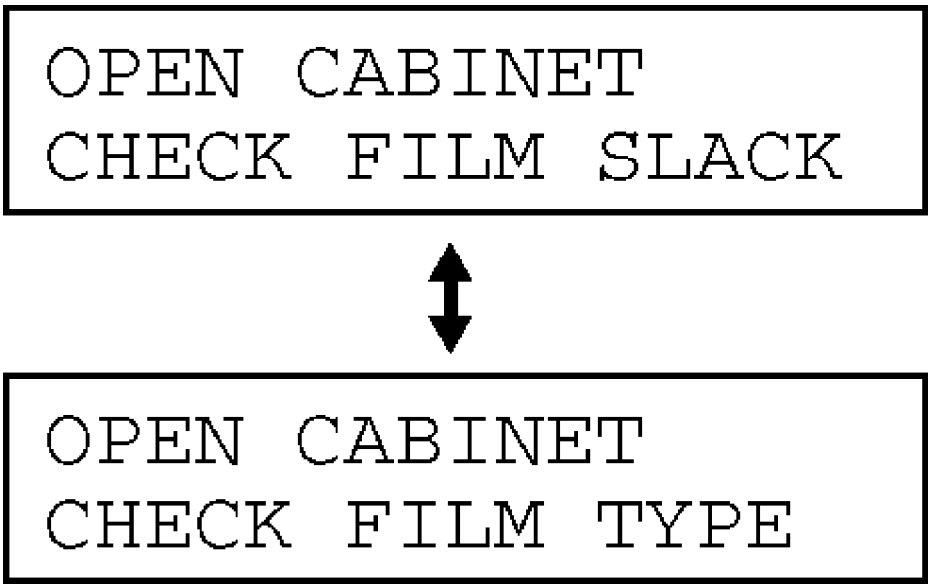
- **There is something wrong with the modem circuit.**

- **The other party´s fax machine is busy or has run out of recording paper. Try again.**

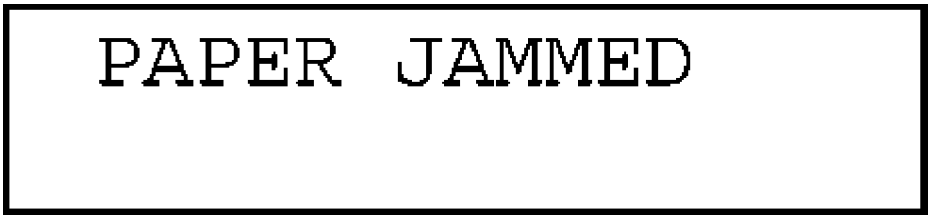
- **Your TAD/FAX greeting message is not recorded. Record a message.**
- **The voice guidance feature is set to OFF. Activate feature #47 on page 48. Prerecorded greeting message will be adopted.**



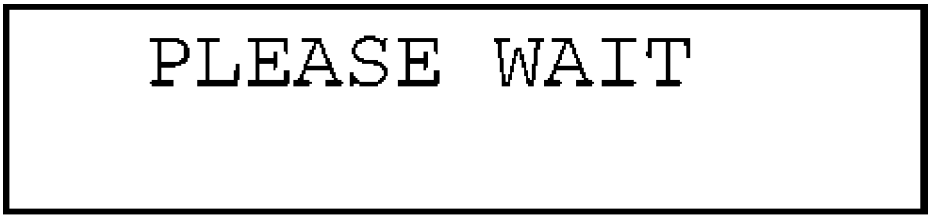
- **Your transfer greeting message is not recorded. Record a message.**
- **The voice guidance feature is set to OFF. Activate feature #47 on page 48. Pre-recorded greeting message will be adopted.**



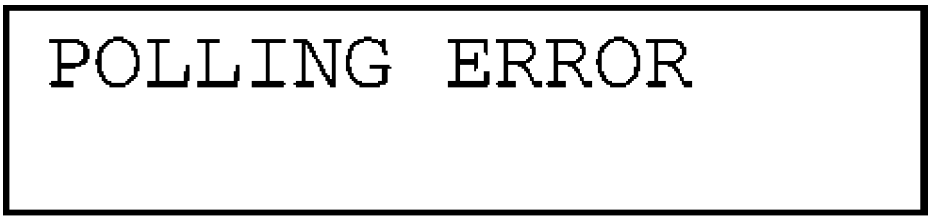
- **Please use genuine Panasonic replacement film.**
- **The ink film is empty. Replace the ink film with a new one.**
- **The ink film is not installed. Install it.**
- **The ink film is slack. Tighten it.**
- **The fax machine is positioned near appliances such as TVs or speakers which generate an intense magnetic field.**



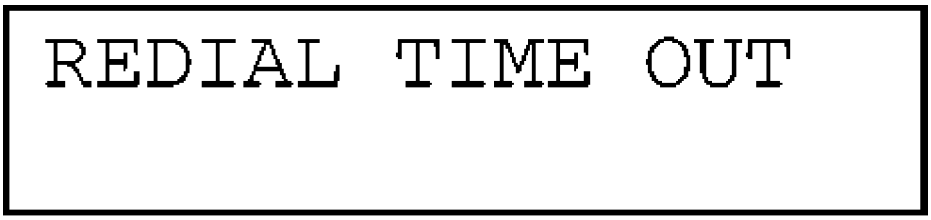
- **A recording paper jam occurred. Clear the jammed paper. (Refer to RECORDING PAPER JAMS ( ).)**



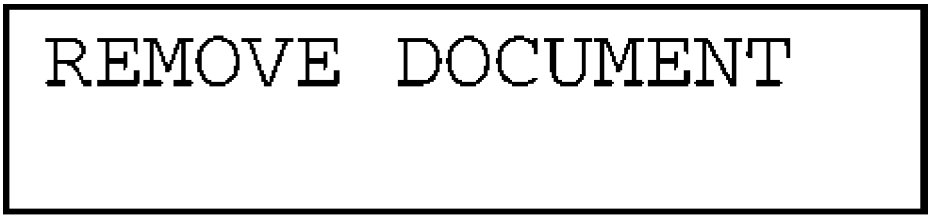
- **The unit is checking that there is no slack on the ink film. Wait for a moment while the check completed.**



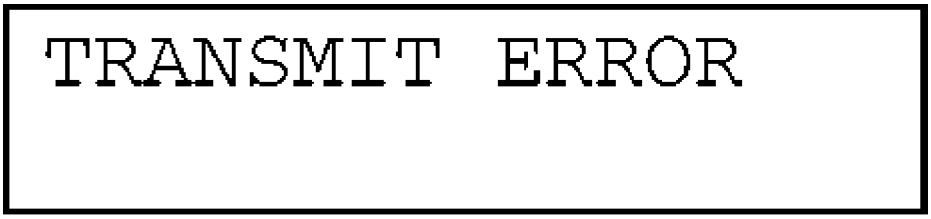
- **The other party's fax machine does not offer the polling function. Check with the other party.**



- **The other party´s fax machine is busy or has run out of recording paper. Try again.**



- **The document is jammed. Remove the jammed document. (Refer to DOCUMENT JAMS ( ).)**



- **A transmission error occurred. Try again.**

- **The unit is too hot. Stop using the unit for a while and let the unit cool down.**

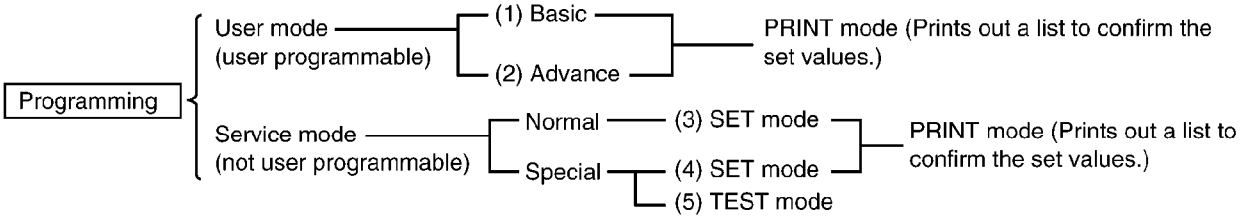
6.3. PROGRAMMING AND LISTS

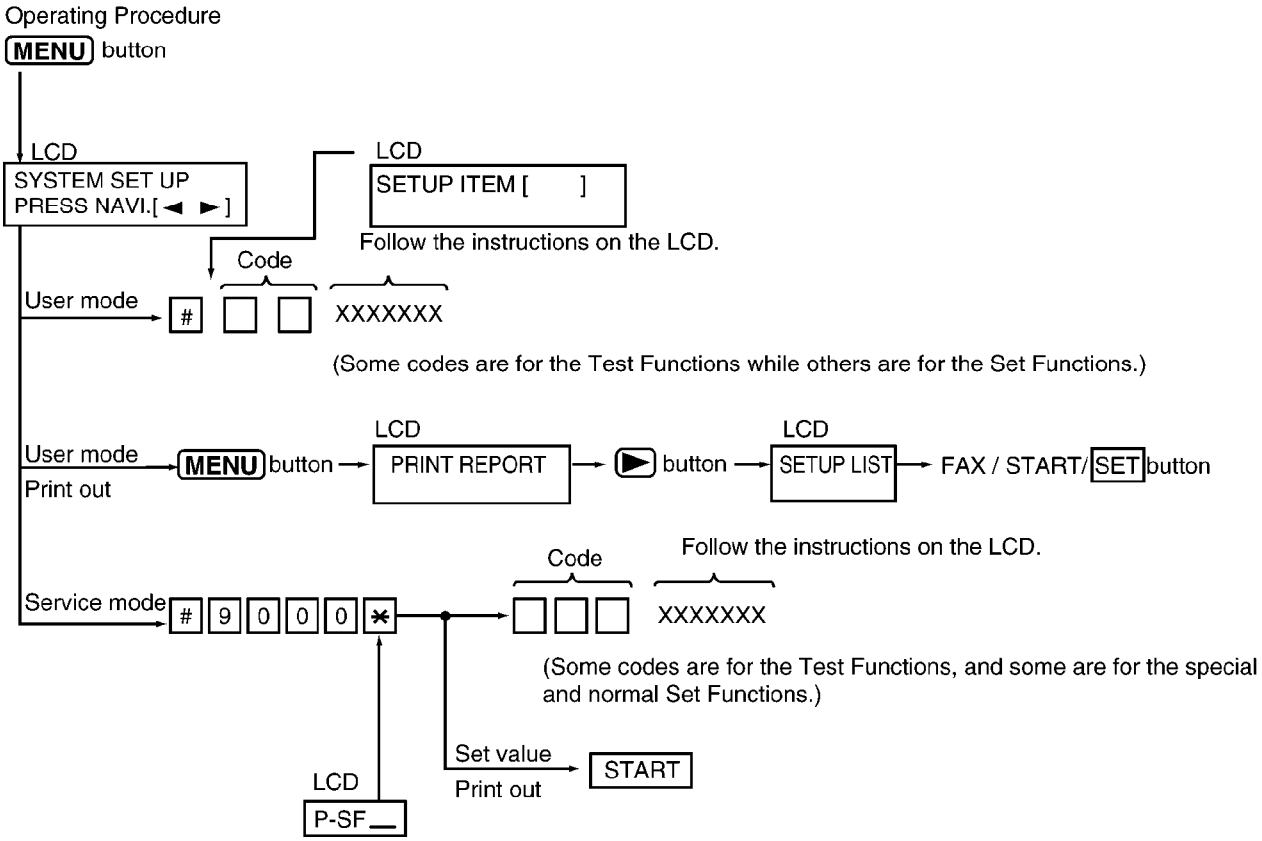
The programming functions are used to program the various features and functions of the machine, and to test the machine.
This facilitates communication between the user and the service man while programming the unit.

6.3.1. OPERATION

There are 2 basic categories of programming functions, the User Mode and the Service Mode. The Service Mode is further broken down into the normal and special programs. The normal programs are those listed in the Operating Instructions and are available to the user. The special programs are only those listed here and not displayed to the user. In both the User and Service Modes, there are Set Functions and Test Functions. The Set Functions are used to program various features and functions, and the Test Functions are used to test the various functions. The Set Functions are accessed by entering their code, changing the appropriate value, then pressing the SET key. The Test Functions are accessed by entering their code and pressing the key listed on the menu. While programming, to cancel any entry, press the STOP key.

6.3.2. OPERATION FLOW





6.3.3. SERVICE FUNCTION TABLE

Code	Function	Set Value	Effective Range	Default	Remarks
501	Pause time	X 100 msec	001~600	30	----------
502	Flash time	X 10 ms	01~99	20	----------
510	VOX time	1: 8 sec 2: 6 sec 3: 4 sec	1~3	2	----------
511	VOX sense	1:High 2: Low	1, 2	1	When the TAM (or EXT TAM) does not stop recording the ICM because noise i detected on the telephone line, change this setting to "LOW".
514	Bell detection time	X 100 msec	1~9	3	----------
520	CED frequency select	1:2100 Hz 2:1100 Hz	1, 2	1	See Symptom/Countermeasure Table f long distance and international calls in The unit can copy, but cannot either transmit/receive long distance or international communications ( ).
521	International mode select	1:ON 2: OFF	1, 2	2	See Symptom/Countermeasure Table f long distance and international calls in The unit can copy, but cannot either transmit/receive long distance or international communications ( ).
522	Auto standby select	1:ON 2: OFF	1, 2	1	The resolution reverts to the default when transmission is complete.
523	Receive equalizer select	1: 0 km 2: 1.8 km 3: 3.6 km 4: 7.2 km	1~4	1	When the telephone station is far from the unit or reception cannot be performed correctly, adjust accordingl
524	Transmission equalizer select	1: 0 km 2: 1.8 km 3: 3.6 km 4: 7.2 km	1~4	1	When the telephone station is far from the unit or transmission cannot be performed correctly, adjust accordingl
544	Document feed position adjustment value set	1: 3 mm 2: 4 mm 3: 5 mm 4: 6 mm 5: 7 mm	1~5	3	When the ADF function is in correct, adjust the feed position.
546	Flash time (CO)	X 10 ms	01~99	8	----------
550	MEMORY CLEAR				See TEST FUNCTIONS( ).

Code	Function	Set Value	Effective Range	Default	Remarks
551	ROM check				See TEST FUNCTIONS( ).
552	DTMF single tone test	1:ON 2: OFF	1, 2	2	See TEST FUNCTIONS( ).
553	Monitor on FAX communication select	1:OFF 2: PHASE B 3 :ALL	1~3	1	Sets whether to monitor the line signal with the unit's speaker during FAX communication or not.
554	Modem test				See TEST FUNCTIONS( ).
555	Scan check				See TEST FUNCTIONS( ).
556	Motor test			0	See TEST FUNCTIONS( ).
557	LED test				See TEST FUNCTIONS( ).
558	LCD test				See TEST FUNCTIONS( ).
559	Document jam detection select	1:ON 2: OFF	1, 2	1	See DOCUMENT JAMS( ).
561	KEY test				See TEST FUNCTIONS( ).
570	Break % select	1:61% 2: 67%	1, 2	1	----------
571	ITS auto redial time set	X number of times	00~99	05	Selects the number of times that ITS is redialed (not including the first dial).
572	ITS auto redial line disconnection time set	X second	001~999	065	Sets the interval of ITS redialing.
573	Remote turn-on ring number set	X number of rings	01~99	10	Sets the number of rings before the un starts to receive a document in the TEL mode.
580	TAM continuous tone detection	1:ON 2: OFF	1, 2	1	ON: Stops TAM operation when Dial tone, etc. are detected.
590	FAX auto redial time set	X number of times	00~99	05	Selects the number of redial times during FAX communication (not including the first dial).
591	FAX auto redial time disconnection time set	X second	001~999	065	Sets the FAX redial interval during FAX communication.

Code	Function	Set Value	Effective Range	Default	Remarks
592	CNG transmit select	1:OFF 2:ALL 3:AUTO	1~3	2	Lets you select the CNG output during FAX transmission. ALL: CNG is output phase A. AUTO: CNG id output only when automatic dialing is performed. OFF: CNG id not output at phase A. Refer to Sometime there is a transmit problem( ).
593	Time between CED and 300bps	1:75 msec 2:500 msec 3:1 sec	1~3	1	See Symptom/Countermeasure Table f long distance and international calls in The unit can copy, but cannot either transmit/receive long distance or international communications ( ). Refer to Receive Problem( ) and The unit can copy, but cannot either transmit/receive long distance o international communications ( ).
594	Overseas DIS detection select	1:detects at the 1st time 2:detects at the 2nd time	1, 2	1	See Symptom/Countermeasure Table f long distance and international calls in The unit can copy, but cannot either transmit/receive long distance or international communications ( ). Refer to Sometime there is a transmit problem( ) and The unit can copy, but cannot either transmit/receive long distance o international communications ( ).
595	Receive error limit check	1: 5% 2: 10% 3: 15% 4: 20%	1~4	2	----------
596	Transmit level set	X dBm	- 15~00	10	Selects the FAX transmission level. Refer to Sometime there is a transmit problem ( )and Receive Problem ( ).
598	Receiving sensitivity	43= -43 dBm	20~48	40	Used when there is an error problem. Refer to The unit can copy, but cannot either transmit/receive long distance o international communications( ).

Code	Function	Set Value	Effective Range	Default	Remarks
599	ECM frame size	1: 256 byte 2: 64 byte	1, 2	1	----------
710	Memory clear except History data				To reset the value to the default one, except History data. Please restart a power supply after clearing a memory.
717	Transmit speed selection	1: 14400BPS 2: 12000BPS 3:9600BPS 4:7200BPS 5:4800BPS 6:2400BPS	1~6	1	Adjusts the speed to start training duri FAX transmission. Refer to Sometime there is a transmit problem ( )and The unit can copy, but the transmission and reception image are incorrect( ).
718	Receive speed selection	1: 14400BPS 2: 12000BPS 3:9600BPS 4:7200BPS 5:4800BPS 6:2400BPS	1~6	1	Adjusts the speed to start training duri FAX reception. Refer to Receive Proble) and The unit can copy, but the transmission and reception image are incorrect ( ).
722	Redial tone detect	1:ON 2: OFF	1, 2	1	Sets the tone detection mode after redialing.
731	CPC mode	1:ON 2: OFF	1, 2	1	Sets the CPC signal detection mode from the converter.
745	Power ON film feed	1:ON 2: OFF	1, 2	1	When the power is turned on, the film i wound to take up any slack.
763	CNG detect time for friendly reception	1:10 sec 2:20 sec 3:30 sec	1~3	3	Selects the CNG detection tone of friendly reception.
771	T1 timer	1:35 sec 2:60 sec	1, 2	1	Sets a higher value when the response from the other party needs more time during FAX transmission.
774	T4 timer	X 100 msec	00~99	00	Use this function when delay occurs in the line and communication (ex. Mobile comm) does not work well.

Code	Function	Set Value	Effective Range	Default	Remarks
775	Monitoring of message transfer	1:ON 2: OFF	1, 2	2	If set to ON a message can be monitore from this unit´s SP-PHONE when transferring a message.
784	Voice prompt test				You can hear the voice prompt from speaker after pressing “START” key.
815	Sensor & Vox check				See TEST FUNCTIONS( ).
841	Digital SP-phone check				See DIGITAL SPEAKERPHONE( ).
852	Print test pattern				See TEST FUNCTIONS ( ).
853	Top margin		1~9	5	----------
874	DTMF on time	060~200 ms	060~200	090	----------
875	DTMF off time	060~200 ms	060~200	090	----------
880	History list				See HISTORY (Example of a printed ou list) ( ).
881	Journal 2 list				See Printout Example ( ).
882	Journal 3 list				See Printout Example ( ).

6.4. TEST FUNCTIONS

The codes listed below can be used to perform simple checks for some of the unit’s functions. When complaints are received from customers, they provide an effective tool for identifying the locations and causes of malfunctions. To do this, you set the Service mode (Refer to OPERATION FLOW ( ).) first, then operate the below test items.

Test Mode	Type of Mode	Code Operation after code input	Function
MOTOR TEST	Service Mode	"5" "5" "6" START	Rotates the transmission and reception motor to check th operation of the motor. 12: FAX TX / Reading memory 14: Document feed 22: Recording paper is fed 32: List / FAX RX print, pull back recording paper 42: Copy 52: Recording paper feed (Test a recording paper feeding operation by shifting from 23 to 33). Press [STOP] button to quit.
MODEM TEST	Service Mode	"5" "5" "4" START	Telephone line circuit is connected automatically, output t following signals on the circuit line. 1) OFF 2)14400bps 3)12000bps 4) 9600bps(V17) 5)7200bps(V17) 6)9600bps 7)7200bps 8) 4800bps 9) 2400b 10) 300bps 11) 2100Hz 12)1100Hz
FLASH MEMORY CHECK	Service Mode	"5" "5" "1" START	Indicates the version and checks the sum of the FLASH MEMORY.
SCAN CHECK	Service Mode	"5" "5" "5" START	Turns on the LEDs of the CIS and operates the read systems.
LCD CHECK	Service Mode	"5" "5" "8" START	Checks the LCD indication. Illuminates all the dots to check if they are normal.
DTMF SINGLE TEST	Service Mode	"5" "5" "2" 1....ON 2....OFF	Outputs the DTMF as single tones. Used to check the frequencies of the individual DTMF tones. Refer to DTMF SINGLE TONE TRANSMIT SELECTION ( ).
LED CHECK	Service Mode	"5" "5" "7" START	All LEDs above the operation panel board flash on and off or are illuminated.
KEY CHECK	Service Mode	"5" "6" "1" START (any key)	Checks the button operation. Indicates the button code on the LCD while the button is pressed. Refer to BUTTON CODE TABLE ( ).
MEMORY CLEAR	Service Mode	"5" "5" "0" START	To reset the value to the default one, except the top margi (#853), time/day (#001), logo (#002), Fax no. (#003), History and Directory data. Please restart a power supply after clearing a memory.

Test Mode	Type of Mode	Code Operation after code input	Function
PRINT TEST PATTERN	Service Mode	"8" "5" "2" START	Prints out the test pattern. Used mainly at the factory to test the print quality. You can select 1~4. (See PRINT TEST PATTERN ( ))
DIGITAL SPEAKERPHONE RX & TX CHECK	Service Mode	"8" "4" "1" SPEAKERPHONE	Please refer to DIGITAL SPEAKERPHONE ( )

Test Mode	Type of Mode	Code Operation after code input	Function
SENSOR CHECK & VOX CHECK	Service Mode	"8" "1" "5" START	If you enter this mode and operate sensor levers with you hands, the LCD display of the related sensor (or switch) turns ON / OFF. Also, when copying a document, the relat sensor will turn ON / OFF. (Do, Sn, Co, Pt, Vx) For each sensor's operation, refer to SENSORS AND SWITCHES( ). [Do Sn Co Pt Vx] : LCD DISPLAY **Do: Document set sensor** **:Paper inserted. Turns on when a document is inserted.** **Sn: Read position sensor.** **:At the read position, turns on when the front cover is opened and the sensor lever is pressed directory.** **Co: Cover open sensor / Film end sensor** **:Cover open of don't set the film. Turns on and c when the front cover is opened and closed.** **Pt: Paper top sensor** **:Sensor on Turns on when the front cover is opened and the sensor lever is pressed directly.** **Vx: Vox signal** **:Detection signal for the tone on the line. Turns when there is a tone signal on the line.**

			Ri: Film sensor **:Sensor on. Turns on and off when the film end sensor gear turns around.**

Note:

The numbers in the boxes (XXX) indicate the keys to be input for the various test modes.

6.4.1. DTMF SINGLE TONE TRANSMIT SELECTION

When set to ON (=1), the 12 keys and transmission frequencies are as shown.

key	High Frequency (Hz)	key	Low Frequency (Hz)
“1”	697	“5”	1209
“2”	770	“6”	1336
“3”	852	“7”	1477
“4”	941	“8”	1633

When set to OFF (=2), the 12 keys and transmission frequencies are as shown.

High (Hz) Low (Hz)	1209	1336	1477
697	“1”	“2”	“3”
770	“4”	“5”	“6”
852	“7”	“8”	“9”
941	“*”	“0”	“#”

Note:

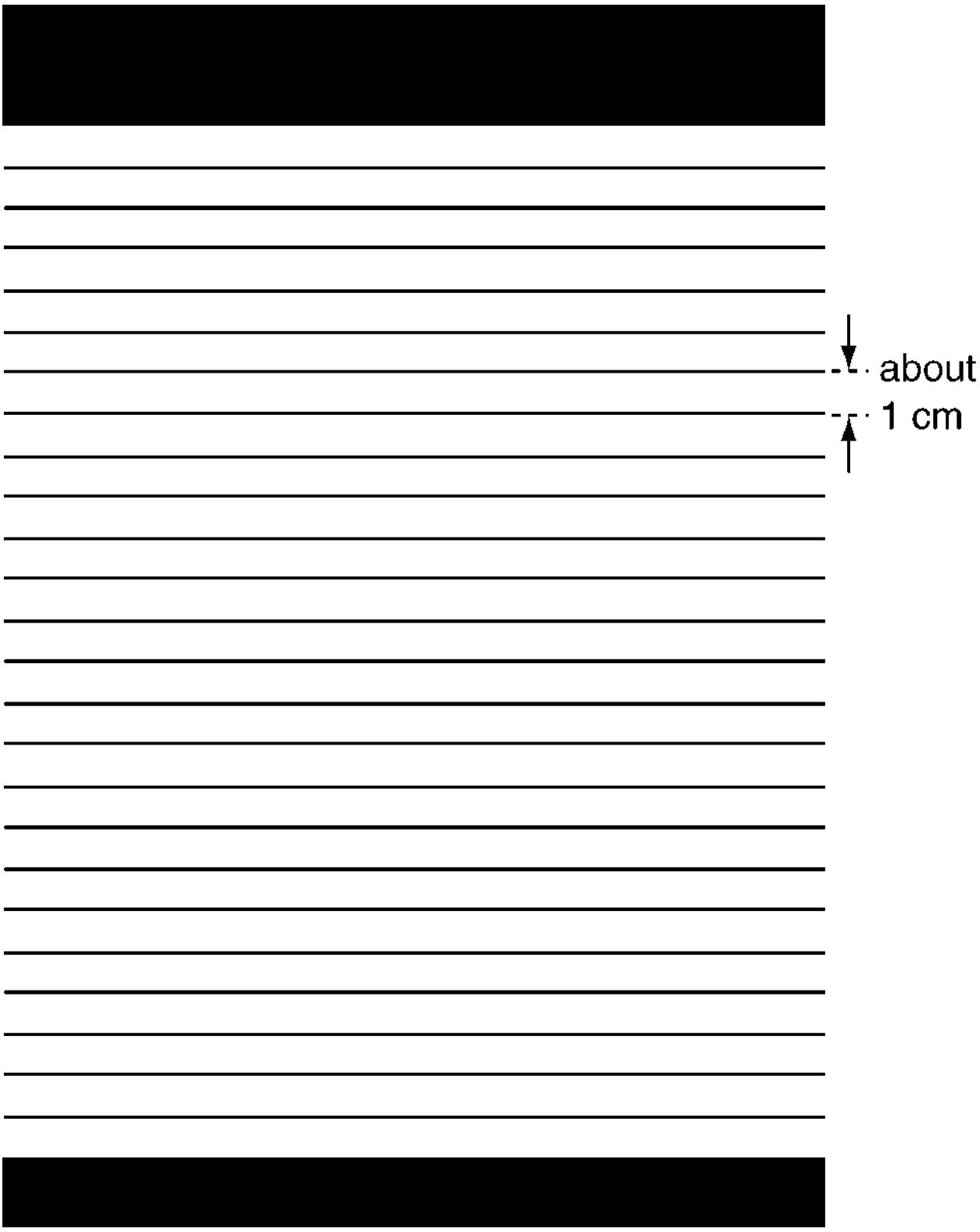
After performing this check, do not forget to turn the setting off.
Otherwise, dialing in DTMF signal will not work.

6.4.2. BUTTON CODE TABLE

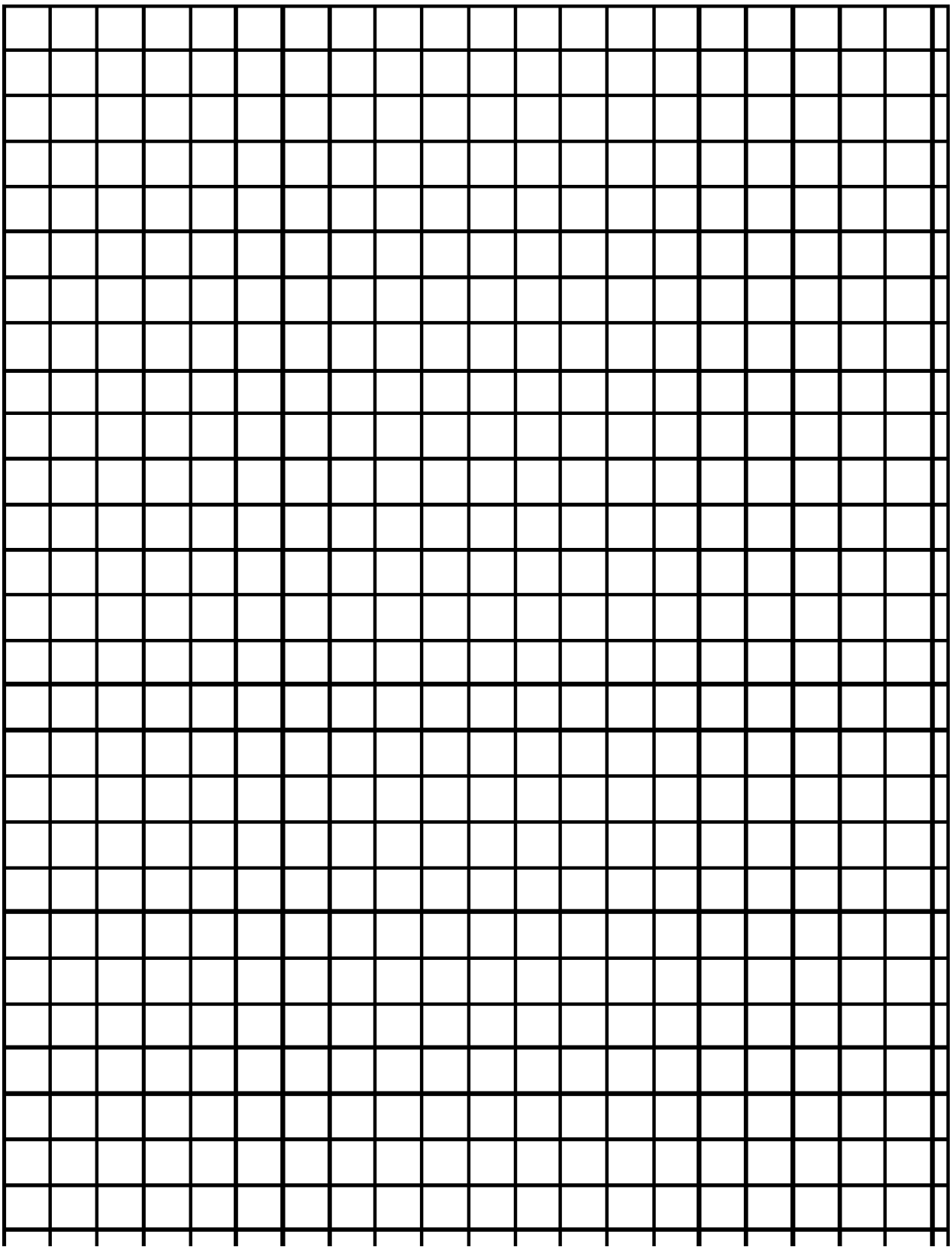
Code	Button Name	Code	Button Name	Code	Button Name
04	FAX /START / SET	25	[+] VOLUME	3A	0
06	COPY	26	[—] VOLUME	3B	✳
08	SP-PHONE	31	1	3C	#
0A	MUTE	33	3	3E	RECALL
0C	AUTO ANSWER	34	4	47	BROADCAST
14	RECORD	35	5	0D	CALLER ID
16	ERASE	36	6	1E	[▶] NEXT
18	PLAY MESSAGE	37	7	1F	[◀] PREV
20	MENU	38	8	00	NO INPUT
22	HELP	39	9	01	STOP

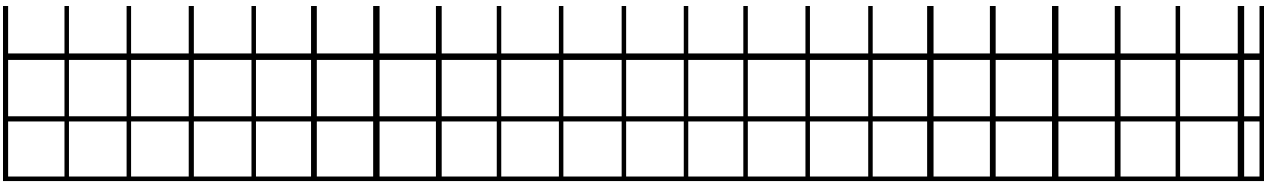
6.4.3. PRINT TEST PATTERN

1. Platen roller

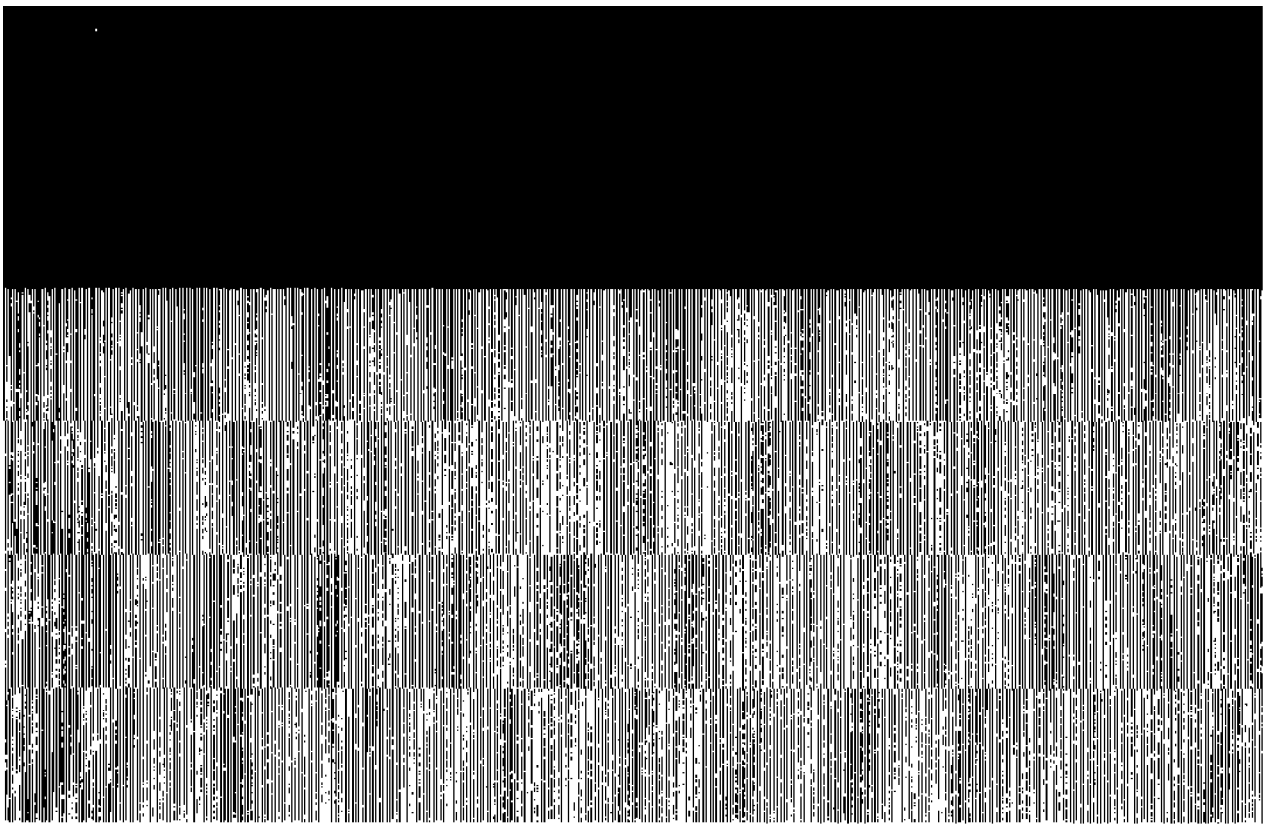

about
1 cm

2. Left margin / Top margin

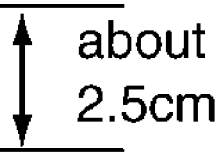




3. Thermal head 1 dot



4. Use this test pattern to confirm the torque limiter for Ink film and platen roller timing.

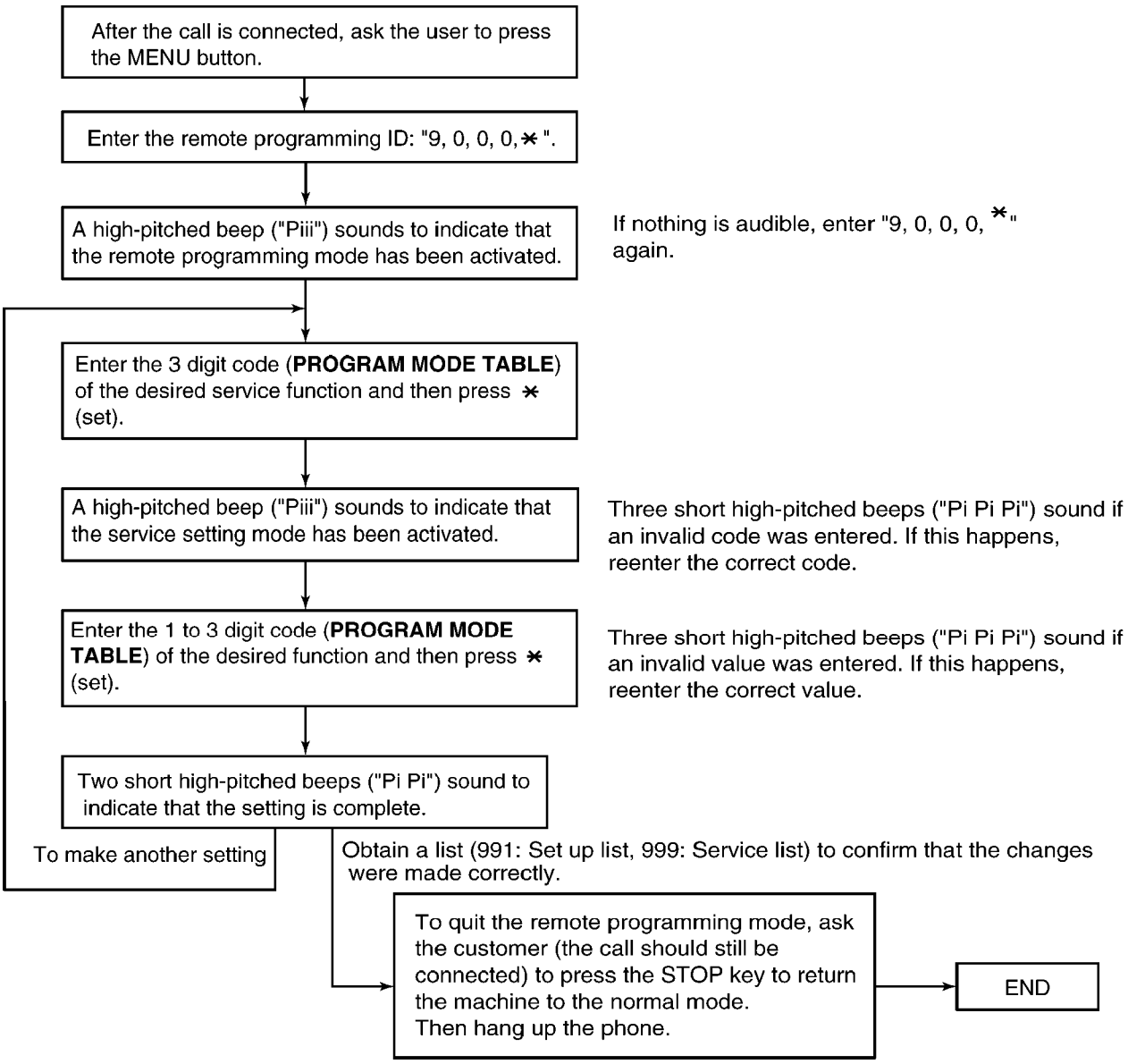

about
2.5cm

6.5. REMOTE PROGRAMMING

**If, after the call is connected, the customer describes the situation and it is determined that the problem can be corrected by making parameter changes, this function makes it possible to change parameters such as the user code and service code from another fax (using DTMF tones). Therefore, travel to the customer's location is not required. However, it is not possible to change all the parameters remotely (PROGRAM MODE TABLE (
)). The function used to accomplish this is remote programming.**
First, in order to check the current status of the service code parameter, print out the setup list (code: 991) and the service list (code: 999) from the customer's fax machine.
Based on this, the parameters for the desired codes can be changed.
**The procedure for changing and listing parameters is described on ENTERING THE REMOTE PROGRAMMING MODE AND CHANGING SERVICE CODES (
). Also, before exiting the remote programming mode, it is advisable to obtain a new list to confirm that the changes were made correctly.**

Hint:
Since the connected telephone is in use during the remote programming mode, it may be helpful to ask the customer to switch to the speakerphone. This frees the customer from the need to remain right next to the fax while you are making parameter settings. When finished, inform the customer. Also note that in very noisy locations where the DTMF tones are not audible, the remote programming function will not work.

6.5.1. ENTERING THE REMOTE PROGRAMMING MODE AND CHANGING SERVICE CODES


After the call is connected, ask the user to press the MENU button.
Enter the remote programming ID: "9, 0, 0, 0, ✱ ".
A high-pitched beep ("Piii") sounds to indicate that the remote programming mode has been activated.
If nothing is audible, enter "9, 0, 0, 0, ✱" again.
Enter the 3 digit code (PROGRAM MODE TABLE) of the desired service function and then press ✱ (set).
A high-pitched beep ("Piii") sounds to indicate that the service setting mode has been activated.
Three short high-pitched beeps ("Pi Pi Pi") sound if an invalid code was entered. If this happens, reenter the correct code.
Enter the 1 to 3 digit code (PROGRAM MODE TABLE) of the desired function and then press ✱ (set).
Three short high-pitched beeps ("Pi Pi Pi") sound if an invalid value was entered. If this happens, reenter the correct value.
Two short high-pitched beeps ("Pi Pi") sound to indicate that the setting is complete.
To make another setting
Obtain a list (991: Set up list, 999: Service list) to confirm that the changes were made correctly.
To quit the remote programming mode, ask the customer (the call should still be connected) to press the STOP key to return the machine to the normal mode.
Then hang up the phone.
END

CROSS REFERENCE:

PROGRAM MODE TABLE ( )

6.5.2. PROGRAM MODE TABLE

Code	Function	Set Value	Default	Remote Setting
001	Set date and time	dd/mm/yy hh:mm	01/Jan/2003	NG
002	Your logo	---------	None	NG
003	Your FAX number	---------	None	NG
004	Print sending report	1:ERROR / 2:ON	ERROR	OK
006	TAD/FAX ring count	1~4 / 5:TOLL SAVER / 6: RINGER OFF	2	OK
010	Recording time	1:VOX / 2~10: 1~9 MIN	VOX	OK
011	Remote TAD ID	ON / OFF	ON ID=111	NG
013	Dialing mode	1:PULSE / 2:TONE	TONE	OK
017	Ringer pattern	A / B / C	A	NG
022	Journal auto print	1:ON / 2:OFF	ON	OK
023	Overseas mode	1:NEXT FAX / 2:ERROR / 3: OFF	ERROR	OK
025	Delayed transmission	ON / OFF	OFF	NG
026	Auto Caller ID list	1:ON / 2:OFF	OFF	OK
034	Quick scan	1:ON / 2:OFF	OFF	OK
036	RCV reduction	1:92% / 2:86% / 3:72% / 4: 100%	92%	OK
039	LCD contrast	NORMAL / DARKER	NORMAL	NG
041	FAX activation code	ON / OFF	ON ID=✳#9	NG
042	Message alert	1:ON / 2:OFF	OFF	OK
043	REC. time alert	1:ON / 2:OFF	OFF	OK
044	Memory receive alert	1:ON / 2:OFF	ON	OK
046	Friendly reception	1:ON / 2:OFF	ON	OK
047	Voice guidance	1:ON / 2:OFF	ON	OK
048	Language	1:ENGLISH / 2:GERMAN	GERMAN	OK
051	Mailbox 1 Password	---------	---------	NG
052	Mailbox 2 Password	---------	---------	NG
054	Greeting MSG. REC. time	1:16s / 2:60s	16s	OK
055	Mailbox 1 Greeting	CHECK / RECORD / ERASE	CHECK	NG
056	Mailbox 2 Greeting	CHECK / RECORD / ERASE	CHECK	NG
062	Line mode	1:CO / 2:PBX	CO	OK
067	ICM monitor	1:ON / 2:OFF	ON	OK
068	ECM selection	1:ON / 2:OFF	ON	NG
069	Express mode	1:ON / 2:OFF	OFF	OK
072	Remote turn on	1:ON / 2:OFF	ON	OK
076	Connecting tone	1:ON / 2:OFF	ON	OK
077	Auto answer mode	3:TAD/FAX 2: FAX Only	TAD/FAX	OK
080	Set default	YES / NO	NO	NG
501	Pause time	001~600 x 100msec	030 x	OK

			100msec	

Code	Function	Set Value	Default	Remote Setting
502	Flash time	01~99 x 10msec	20 x 10msec	OK
510	Vox time	1:8 sec / 2:6 sec / 3: 4 sec	6sec	OK
511	Vox sense	1:High / 2:Low	High	OK
514	Bell detection time	1~9 x 100msec	3 x 100msec	OK
520	CED frequency select	1:2100Hz / 2:1100Hz	2100Hz	OK
521	International mode select	1:ON / 2:OFF	OFF	OK
522	Auto standby select	1:ON / 2:OFF	ON	OK
523	Receive equalizer select	1:0km / 2:1.8km / 3:3.6km / 4: 7.2km	0km	OK
524	Transmission equalizer select	1:0km / 2:1.8km / 3:3.6km / 4: 7.2km	0km	OK
544	Document feed position adjustment value set	1:3mm / 2:4mm / 3:5mm / 4: 6mm / 5:7mm	5mm	OK
546	Flash time (CO)	01~99 x 10msec	08 x 10msec	OK
550	Memory clear	---------	---------	NG
551	ROM check	---------	---------	NG
552	DTMF signal tone test	1:ON / 2:OFF	OFF	OK
553	Monitor on FAX communication	1:OFF / 2:Phase B / 3:ALL	OFF	OK
554	Modem test	---------	---------	NG
555	Scanner test	---------	---------	NG
556	Motor test	---------	---------	NG
557	LED test	---------	---------	NG
558	LCD test	---------	---------	NG
559	Document jam detection	1:ON / 2:OFF	ON	OK
561	Key test	---------	---------	NG
570	Break % select	1:61% / 2:67%	61%	OK
571	ITS auto redial time set	00~99	05	OK
572	ITS auto redial line disconnection time set	001~999sec	065sec	OK
573	Remote turn-on ring number	01~99	10	OK
580	TAM continuous tone detection	1:ON / 2:OFF	ON	OK
590	FAX auto redial time set	00~99	05	OK
591	FAX auto redial line disconnection time set	001~999sec	065sec	OK
592	CNG transmit select	1:OFF / 2:ALL / 3:AUTO	ALL	OK
593	Time between CED and 300 bps	1:75ms / 2:500ms / 3:1sec	75ms	OK
594	Overseas DIS detection	1:1st / 2:2nd	1st	OK
595	Receive error limit check	1: 5% / 2: 10% / 3: 15% / 4: 20%	10%	OK
596	Transmit level set	-15~00dBm	10dBm	OK
598	Receiving Sensitivity	20~48 dBm	40	OK
599	ECM frame size	1:256 byte / 2:64 byte	256 byte	OK

Code	Function	Set Value	Default	Remote Setting
710	Memory clear except History data	---------	---------	NG
717	Transmit speed select	1:14400 / 2:12000 / 3:9600/ 4: 7200/ 5:4800/ 6:2400	14400bps	OK
718	Receive speed select	1:14400 / 2:12000 / 3:9600/ 4: 7200/ 5:4800/ 6:2400	14400bps	OK
722	Redial tone detect	1:ON / 2:OFF	ON	OK
731	CPC mode	1:ON / 2:OFF	ON	OK
745	Power on film feed	1:ON / 2:OFF	ON	OK
763	CNG detect time for friendly reception	1:10s / 2:20s / 3:30s	30s	OK
771	T1 timer	1:35s / 2:60s	35s	OK
774	T4 timer	00~99 x 100ms	00ms	OK
775	Monitoring of message transfer	1:ON / 2:OFF	OFF	OK
784	Voice prompt	1:Start	---------	NG
815	Sensor & VOX test	---------	---------	NG
841	Digital SP-Phone RX & TX check	1:SP-Phone	---------	NG
852	Print test pattern	---------	---------	NG
853	Top margin	1~9 mm	5	OK
874	DTMF ON time	060~200 ms	090ms	OK
875	DTMF OFF time	060~200 ms	090ms	OK
880	History list	1:Start	---------	NG
881	Journal 2	1:Start	---------	NG
882	Journal 3	1:Start	---------	NG
991	Setup list	1:Start	---------	OK
994	Journal list	1:Start	---------	OK
995	Journal 2 list	1:Start	---------	OK
996	Journal 3 list	1:Start	---------	OK
998	History list	1:Start	---------	OK
999	Service list	1:Start	---------	OK

OK means "can set".
NG means "can not set".

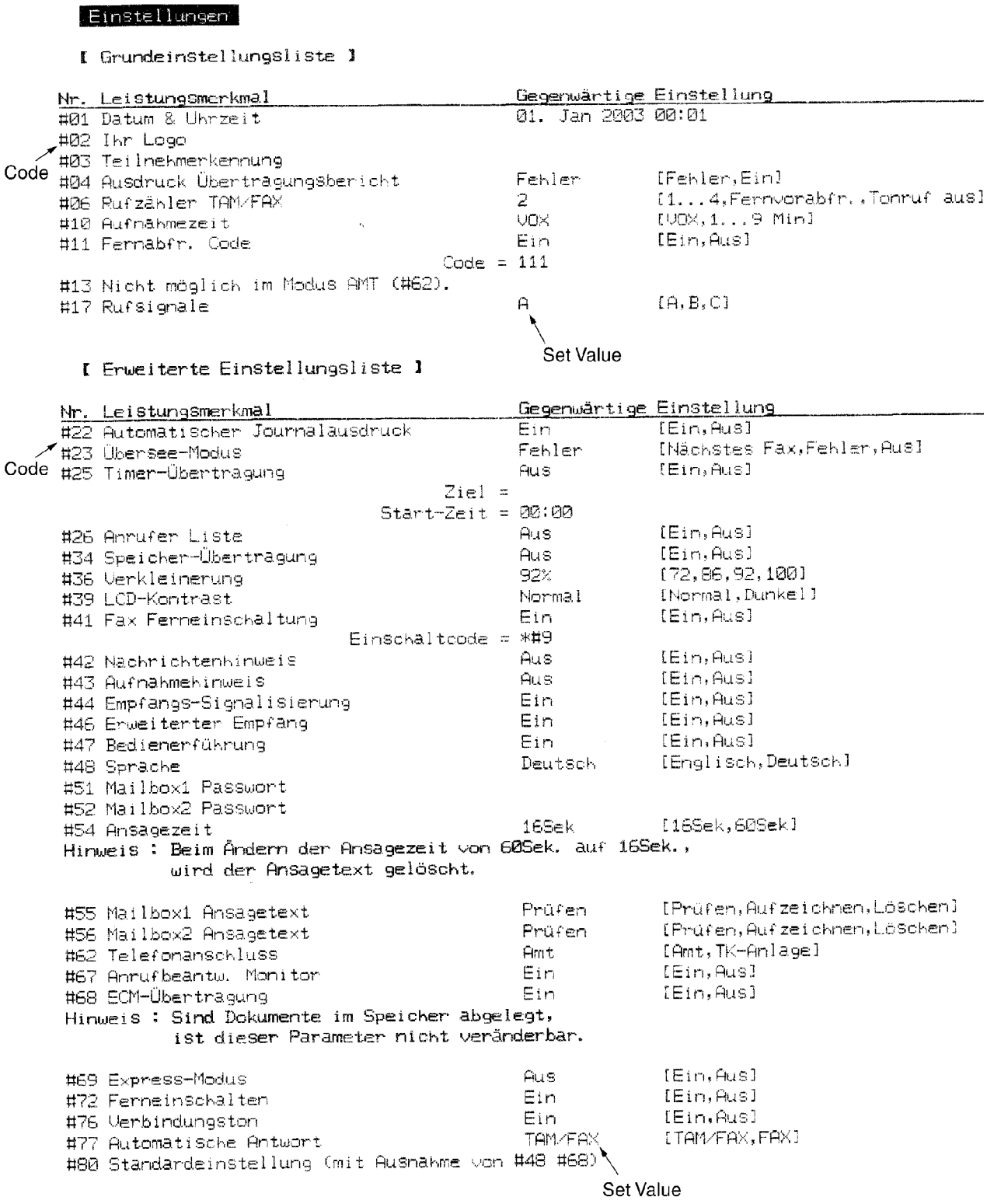
Note:
Refer to SERVICE FUNCTION TABLE (
) for descriptions of the individual codes.

Example:
If you want to set value in the "004 Transmission report mode", press the dial key

number 1,2 or 3 corresponding to the Set Value you want to select. (1:ERROR/2:ON/ 3:OFF)

6.6. THE EXAMPLE OF THE PRINTED LIST

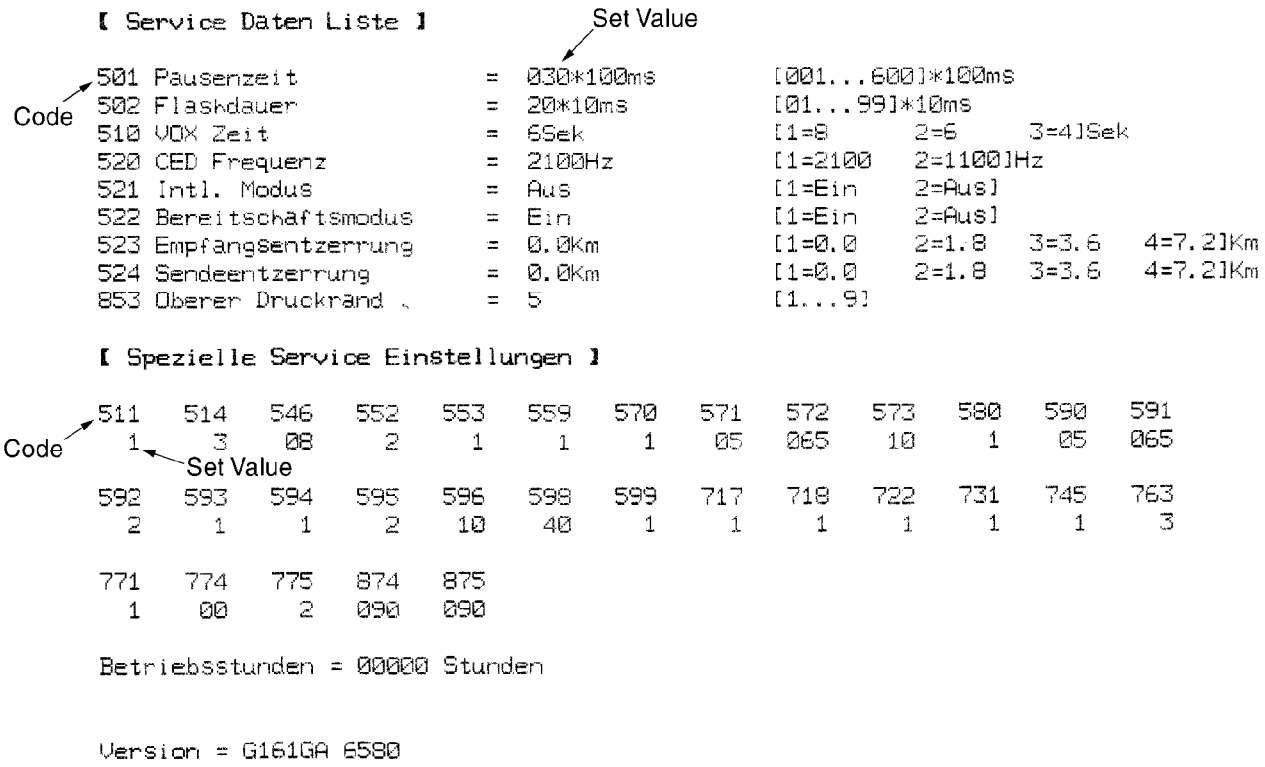
6.6.1. USER MODE (Example of a printed out list)


Einstellungen
[Grundeinstellungsliste]
Nr. Leistungsmerkmal
Gegenwärtige Einstellung
#01 Datum & Uhrzeit
01. Jan 2003 00:01
#02 Ihr Logo
#03 Teilnehmerkennung
Code
#04 Ausdruck Übertragungsbericht
Fehler
[Fehler,Ein]
#06 Rufzähler TAM/FAX
2
[1...4,Fernvorabfr.,Tonruf aus]
#10 Aufnahmezeit
VOX
[VOX,1...9 Min]
#11 Fernabfr. Code
Ein
[Ein,Aus]
Code = 111
#13 Nicht möglich im Modus AMT (#62).
#17 Rufsignale
A
[A,B,C]
Set Value
[Erweiterte Einstellungsliste]
Nr. Leistungsmerkmal
Gegenwärtige Einstellung
#22 Automatischer Journalausdruck
Ein
[Ein,Aus]
Code
#23 Übersee-Modus
Fehler
[Nächstes Fax,Fehler,Aus]
#25 Timer-Übertragung
Aus
[Ein,Aus]
Ziel =
Start-Zeit = 00:00
#26 Anrufer Liste
Aus
[Ein,Aus]
#34 Speicher-Übertragung
Aus
[Ein,Aus]
#36 Verkleinerung
92%
[72,86,92,100]
#39 LCD-Kontrast
Normal
[Normal,Dunkel]
#41 Fax Ferneinschaltung
Ein
[Ein,Aus]
Einschaltcode = *#9
#42 Nachrichtenhinweis
Aus
[Ein,Aus]
#43 Aufnahmehinweis
Aus
[Ein,Aus]
#44 Empfangs-Signalisierung
Ein
[Ein,Aus]
#46 Erweiterter Empfang
Ein
[Ein,Aus]
#47 Bedienerführung
Ein
[Ein,Aus]
#48 Sprache
Deutsch
[Englisch,Deutsch]
#51 Mailbox1 Passwort
#52 Mailbox2 Passwort
#54 Ansagezeit
16Sek
[16Sek,60Sek]
Hinweis : Beim Ändern der Ansagezeit von 60Sek. auf 16Sek.,
wird der Ansagetext gelöscht.
#55 Mailbox1 Ansagetext
Prüfen
[Prüfen,Aufzeichnen,Löschen]
#56 Mailbox2 Ansagetext
Prüfen
[Prüfen,Aufzeichnen,Löschen]
#62 Telefonanschluss
Amt
[Amt,TK-Anlage]
#67 Anrufbeantw. Monitor
Ein
[Ein,Aus]
#68 ECM-Übertragung
Ein
[Ein,Aus]
Hinweis : Sind Dokumente im Speicher abgelegt,
ist dieser Parameter nicht veränderbar.
#69 Express-Modus
Aus
[Ein,Aus]
#72 Ferneinschalten
Ein
[Ein,Aus]
#76 Verbindungston
Ein
[Ein,Aus]
#77 Automatische Antwort
TAM/FAX
[TAM/FAX,FAX]
#80 Standardeinstellung (mit Ausnahme von #48 #68)
Set Value

Note:

The above values are the default values.

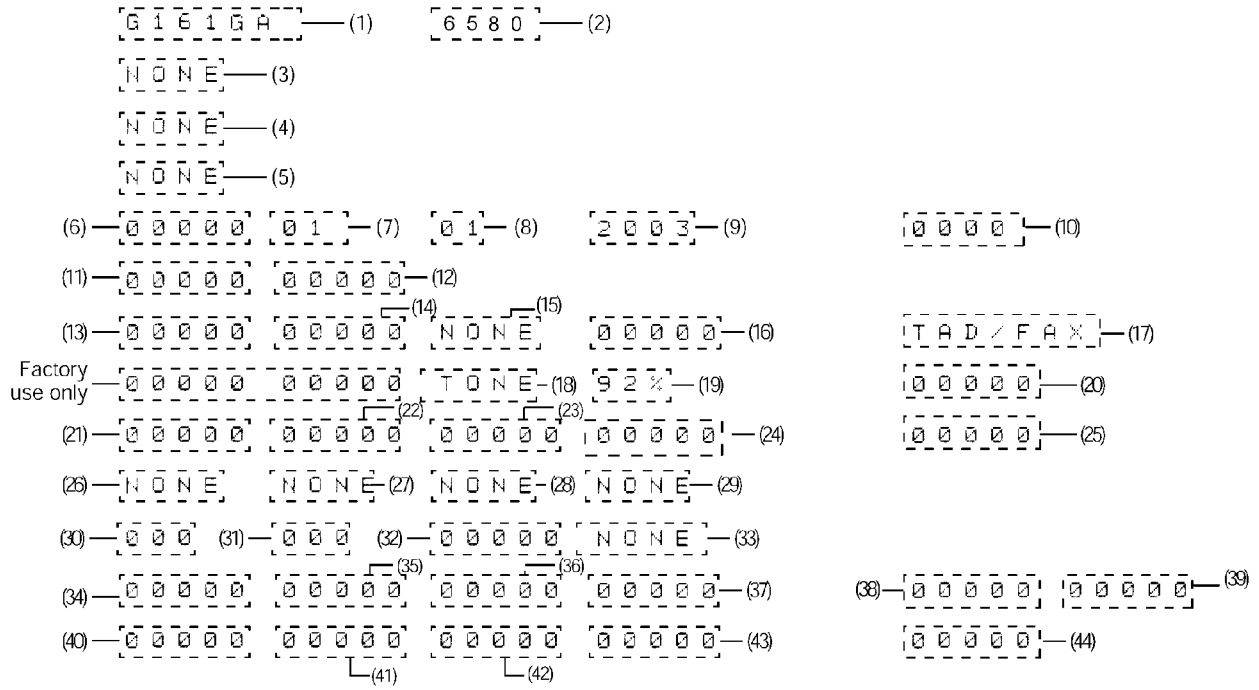
6.6.2. SERVICE MODE SETTINGS (Example of a printed out list)



Note:
The above values are the default values.

6.6.3. HISTORY (Example of a printed out list)

【 HISTORY 】



NAME _____ DATE _____ DEALER _____ FILM _____

CUSTOMER COMPLAINT

SURVEY RESULT : CKOK (UNKNOWN/DESIGN/EDUC) DEFECT (PART/WORKER/DESIGN)
ABUSE (CUST/DEALER/SHIP) NEW (OPEN/NOT)
PHONE SURVEY RESULT.

Note:
**See the following descriptions of this report. Item No. (1) ~ (44) are corresponding to the listed items in DESCRIPTIONS OF THE HISTORY REPORT(
).**

6.6.3.1. DESCRIPTIONS OF THE HISTORY REPORT

(1) SOFTWARE VERSION
FLASH ROM version
(2) SUM
FLASH ROM internal data calculation.
(3) YOUR LOGO
The user logo recorded in the unit. If it is not recorded, NONE will be displayed.
(4) YOUR TELEPHONE NUMBER
The user telephone number recorded in the unit. If it is not recorded, NONE will be displayed.
(5) FAX PAGER NUMBER
If you program a pager number into the unit, the pager number will be displayed here.
(6) FACTORY - CUSTOMER
This shows how many days from factory production until the user turns ON the unit.
(7) MONTH
The shows the very first month, date, year and time set by the user after they purchased the unit.
(8) DAY
The shows the very first month, date, year and time set by the user after they purchased the unit.
(9) YEAR
The shows the very first month, date, year and time set by the user after they purchased the unit.
(10) TIME
The shows the very first month, date, year and time set by the user after they purchased the unit.
(11) USAGE TIME
The amount of time the unit has been powered ON.
(12) FACTORY - NOW
This shows how many days from factory production until the user prints out this history list.
(13) TEL MODE
The amount of time the TEL mode setting was used.

(14) FAX MODE
The amount of time the FAX mode setting was used.
(15) TEL/FAX MODE
The amount of time the TEL/FAX mode setting was used.
(16) ANS/FAX MODE
The amount of time the ANS/FAX mode setting was used.
(17) FINAL RECEIVE MODE
The last set receiving mode by the user.
(18) TONE/PULSE SELECTION
The most recently used setting used, either TONE or PULSE.
(19) RECEIVE REDUCTION
The compression rate when receiving.
(20) SETTING NO. OF DIRECTORY
The recorded directory stations.
(21) NUMBER OF COPY
The number of pages copied.
(22) NUMBER OF RECEIVE
The number of pages received.
(23) NUMBER OF SENDING
The number of pages sent.
(24) NUMBER OF CALLER ID
The number of times Caller ID was received.
(25) NUMBER OF RECORDING MESSAGE
The number of messages recorded in TAM.
(26)~(29) Not Used
(30) NUMBER OF PRINTING WARNING LIST
The number of warning lists printed until now.
(31) NUMBER OF PRINTING HELP
The number of help lists printed until now.
(32) NUMBER OF DIVIDED PRINTING IN FAX RECEPTION
The number of faxes received that were divided into more than one sheet since the unit was purchased.
(33) Not used
(34) FAX MODE
Means the unit received a fax message in the FAX mode.
(35) MAN RCV
Means the unit received a fax message by manual operation.
(36) FRN RCV
Means the unit received a fax message by friendly signal detection.
(37) VOX

Means the unit detected silence or no voice.
(38) RMT DTMF
Means the unit detected DTMF (Remote Fax activation code) entered remotely.
(39) PAL DTMF
Means the unit detected DTMF (Remote Fax activation code) entered by a parallel connected telephone.
(40) TURN-ON
Means the unit started to receive after 10 rings. (Remote Turn On: Service Code #573)
(41) TIME OUT
Means the unit started to receive after Ring Time Out in the EXT-TAM or TEL/FAX mode.
(42) IDENT
Means the unit detected Ring Detection.
(43) CNG OGM
Means the unit detected the CNG while it was sending the Dummy Ring Back Tone in the TEL/FAX mode, or while answering a call in the EXT-TAM mode. Or means the unit detected the CNG while it was sending the OGM in the ANS/FAX mode.
(44) CNG ICM
Means the unit detected the CNG while it was recording the ICM in the ANS/FAX mode.

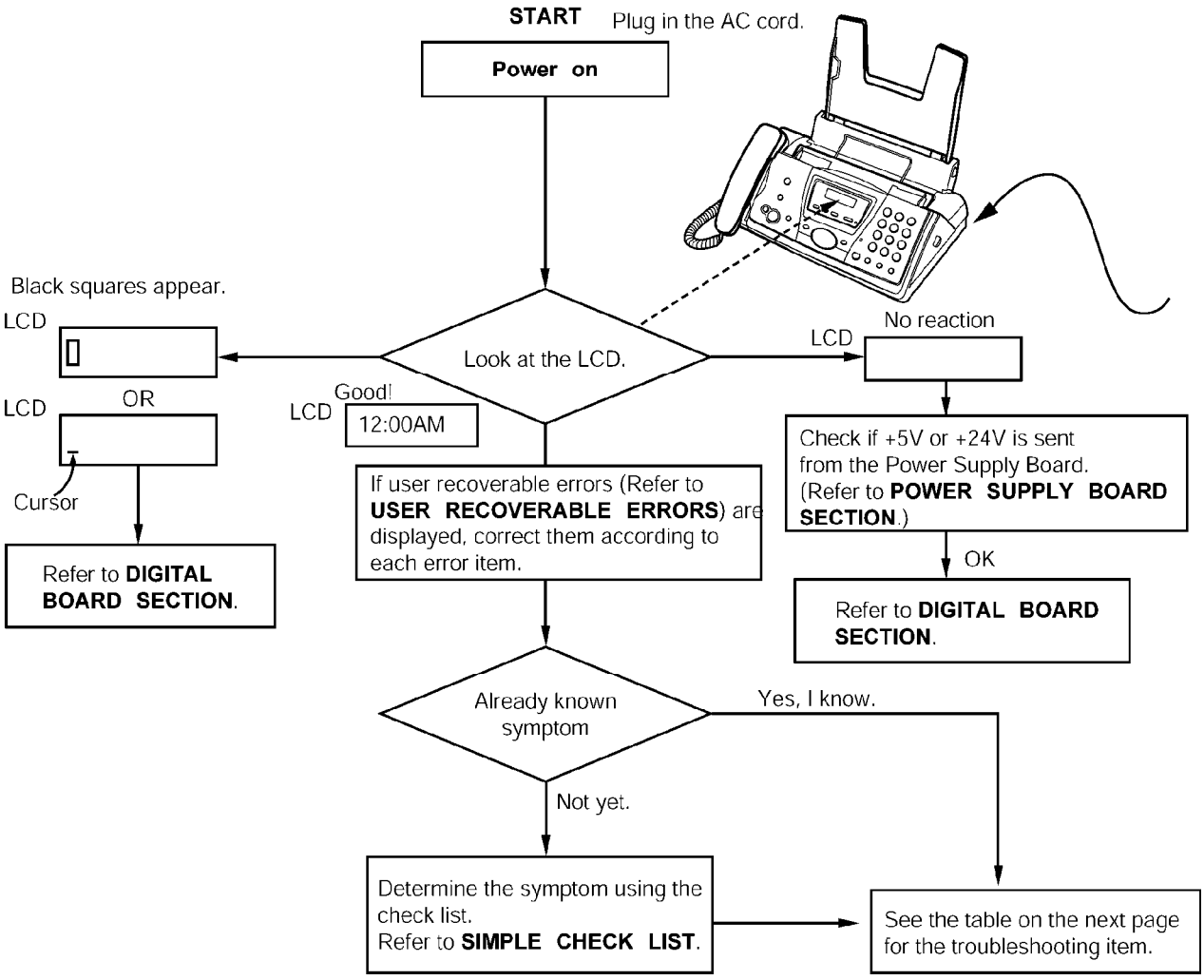
6.7. TROUBLESHOOTING DETAILS

6.7.1. OUTLINE

Troubleshooting is for recovering quality and reliability by determining the broken component and replacing, adjusting or cleaning it as required. First, determine the problem then decide the troubleshooting method. If you have difficulty finding the broken part, determine which board is broken. (For example: the Digital PCB, Analog PCB, etc.) The claim tag from a customer or dealer may use different expressions for the same problem, as they are not a technician or engineer. Using your experience, test the problem area corresponding to the claim. Also, returns from a customer or dealer often have a claim tag. For these cases as well, you need to determine the problem. Test the unit using the simple check list on SIMPLE CHECK LIST(
). Difficult problems may be hard to determine, so repeated testing is necessary.

6.7.2. STARTING TROUBLESHOOTING

Determine the symptom and the troubleshooting method.


START
Plug in the AC cord.
Power on
Look at the LCD.
Black squares appear.
LCD
OR
LCD
Cursor
Refer to DIGITAL BOARD SECTION.
Good!
LCD
12:00AM
No reaction
LCD
Check if +5V or +24V is sent from the Power Supply Board. (Refer to POWER SUPPLY BOARD SECTION.)
OK
Refer to DIGITAL BOARD SECTION.
If user recoverable errors (Refer to USER RECOVERABLE ERRORS) are displayed, correct them according to each error item.
Already known symptom
Yes, I know.
Not yet.
Determine the symptom using the check list.
Refer to SIMPLE CHECK LIST.
See the table on the next page for the troubleshooting item.

CROSS REFERENCE:

USER RECOVERABLE ERRORS( )

SIMPLE CHECK LIST( )

DIGITAL BOARD SECTION( )

POWER SUPPLY BOARD SECTION(
)

6.7.3. TROUBLESHOOTING ITEMS TABLE

ITEM	SYMPTOM	REFERENCE
ADF (Auto Document Feeder)	The document does not feed.	See No Document Feed ( )
	Document jam	See Document Jam ( )
	Multiple feed	See Multiple Document Feed ( )
	Skew	See Document Skew ( )
Recording paper feed	The recording paper does not feed.	See The Recording Paper Does not Feed ( )
	Paper jam	See Paper Jam ( )
	Multiple feed and skew	See Recording Paper Multiple Feed and Ske)
Printing	The sent fax data is skewed.	See The sent fax data is skewed ( )
	The received fax data is skewed.	See The received fax data is skewed ( )
	The received or copied data is expanded.	See Received or copied data is expanded ( )
	A black page is copied.	See A blank page is copied ( )
	A blank page is received.	See A blank page is received ( )
	Black or white vertical line	See Black or white vertical line on print out)
	Black or white lateral line on print out	See Black or white lateral line on print out ( )
	An abnormal image is printed	See An abnormal image is printed ( )
Communication FAX, TEL (analog board)	Cannot communicate by fax. An error code is displayed.	See COMMUNICATION SECTION ( ) and How to output the journal report ( )

ITEM	SYMPTOM	REFERENCE
	Cannot talk. The DTMF tone doesn't work. The handset / monitor doesn't work, etc.	See ANALOG BOARD SECTION ( )
Operation panel	Keys are not accepted.	See OPERATION PANEL SECTION ( )
Sensor	If the electric circuit is the cause, the error message corresponding to the sensor will be displayed.	See SENSOR SECTION ( )

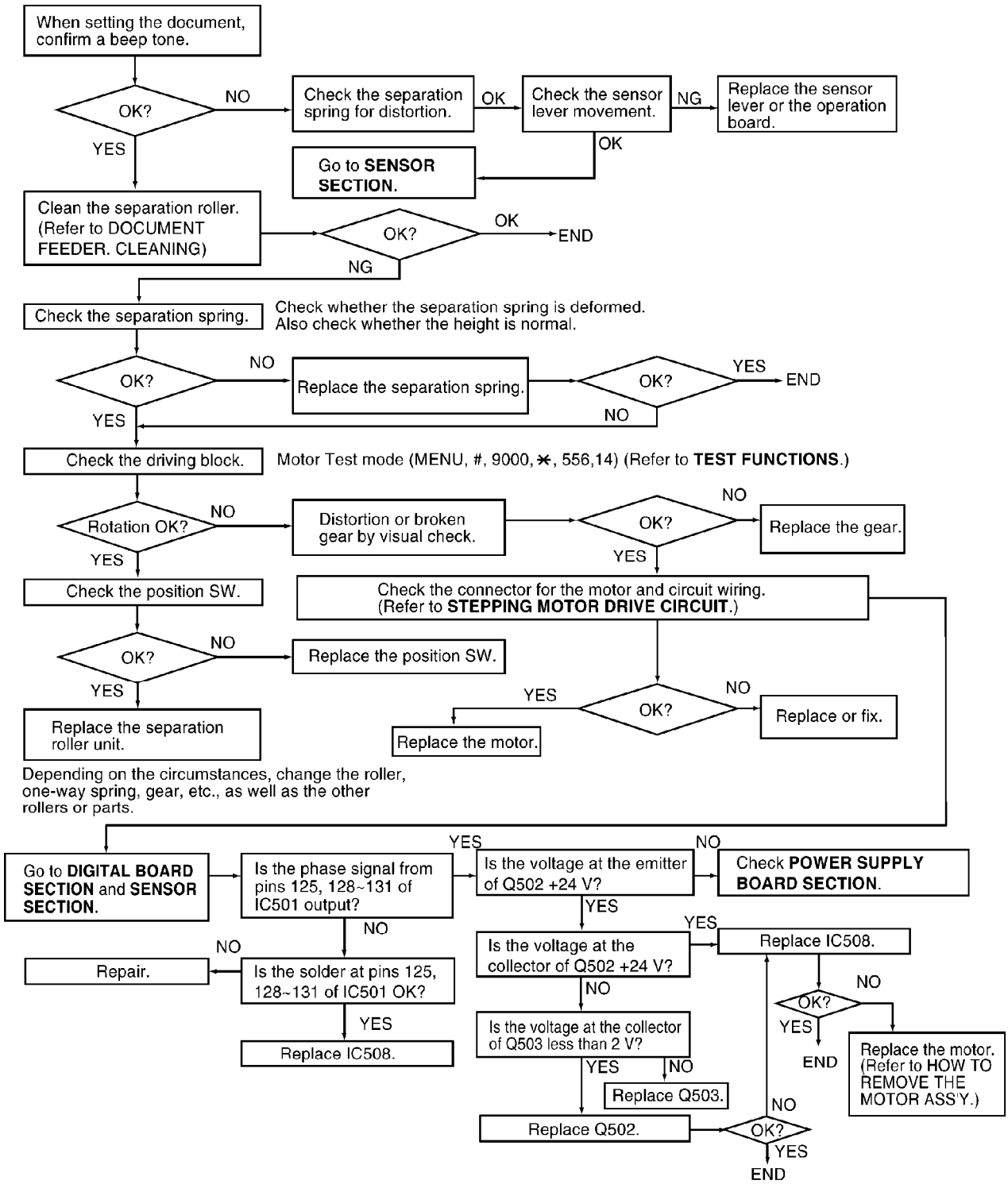
6.7.3.1. SIMPLE CHECK LIST

SERIAL NO.		DATE	
FUNCTION		JUDGEMENT	REFERENCE
FAX operation	Transmission	OK / NG	
	Receiving	OK / NG	
Copy operation		OK / NG	
Telephone operation	Handset transceiver / receiver	OK / NG	
	SP-PHONE sound	OK / NG	
	Ringer sound	OK / NG	
	Dial operation	OK / NG	
	Volume operation	OK / NG	
	VOX detection	OK / NG	Service code #815 (Refer to TEST FUNCTIONS ( ).)
Operation Panel	Key check	OK / NG	Service code #561 (Refer to TEST FUNCTIONS ( ).)
	LED check	OK / NG	Service code #557 (Refer to TEST FUNCTIONS ( ).)
	LCD check	OK / NG	Service code #558 (Refer to TEST FUNCTIONS ( ).)
Sensor	Sensor check	OK / NG	Service code #815 (Refer to TEST FUNCTIONS ( ).)
Clock	Display changing	OK / NG	Is the time kept correctly? Check with another clock.

SERIAL NO.		DATE	
FUNCTION		JUDGEMENT	REFERENCE
Digital TAM	Greeting REC / PLAY	OK / NG	
	Incoming message REC / PLAY	OK / NG	
	Memo REC / PLAY	OK / NG	
Voice prompt		OK / NG	Service code #784 (Refer to TEST FUNCTIONS ( ).) Check whether voice prompt is play or not.

6.7.4. ADF (Auto Document Feed) AND PAPER FEED SECTION

6.7.4.1. No Document Feed



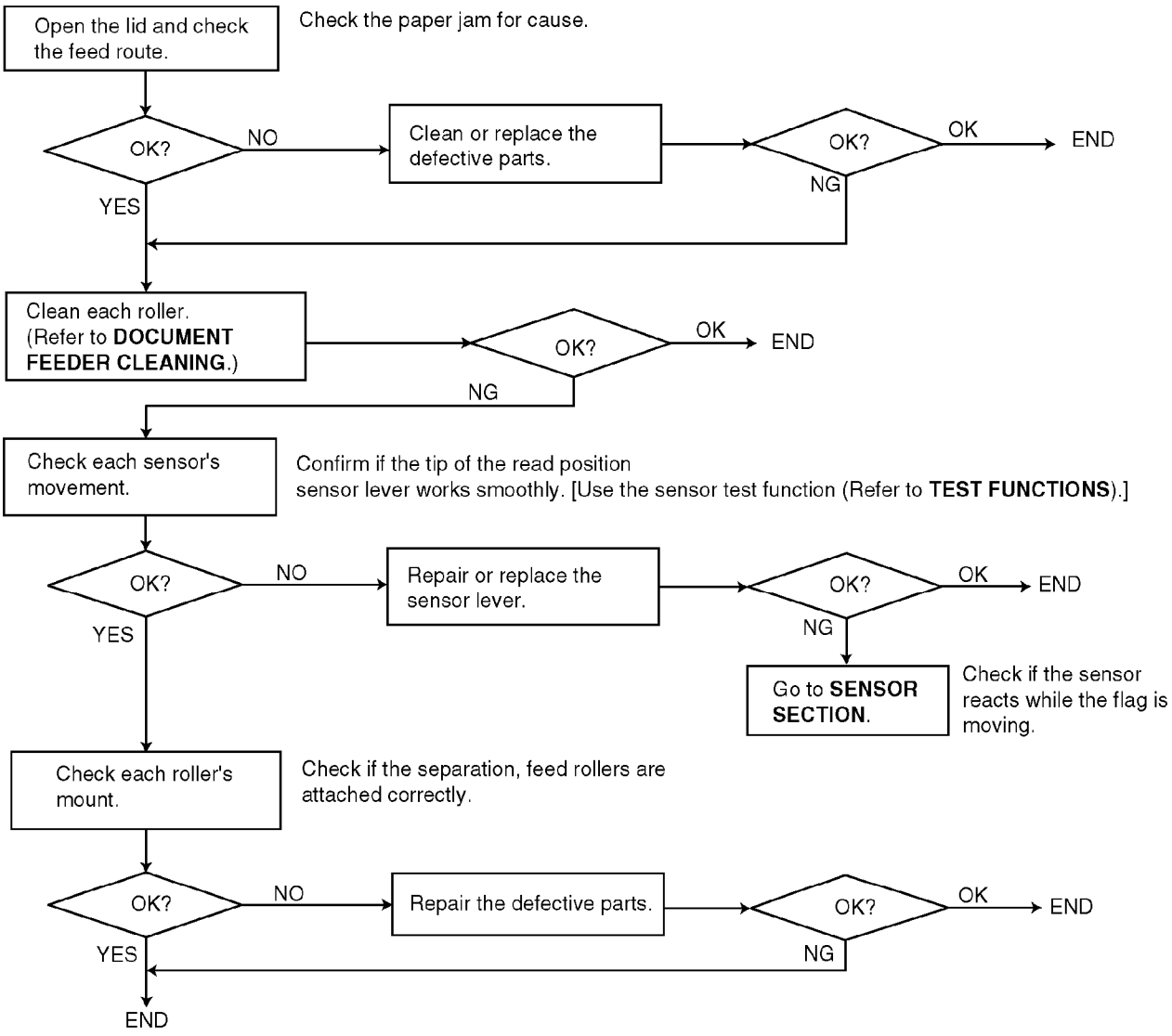
CROSS REFERENCE:

DIGITAL BOARD SECTION(

)

POWER SUPPLY BOARD SECTION(
)
SENSOR SECTION(
)
TEST FUNCTIONS(
)
DISASSEMBLY INSTRUCTIONS(
)
Document feeder/scanner glass cleaning (Separation roller cleaning)(
)
STEPPING MOTOR DRIVE CIRCUIT(
)

6.7.4.2. Document Jam



CROSS REFERENCE:

TEST FUNCTIONS(

)

SENSOR SECTION(

)

Document feeder/scanner glass cleaning (Separation roller cleaning)(

)

6.7.4.3. Multiple Document Feed

- **When using thick paper etc., sometimes the document will not be fed.**

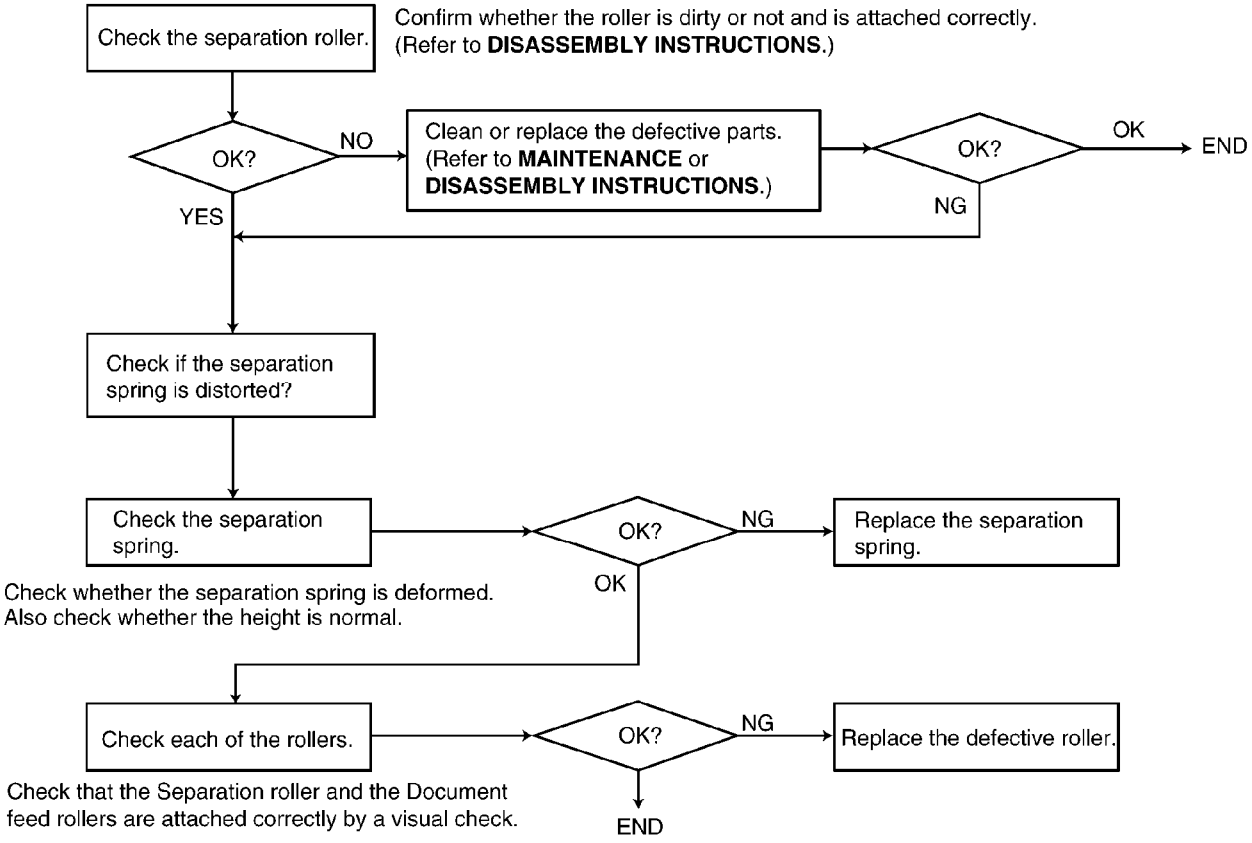
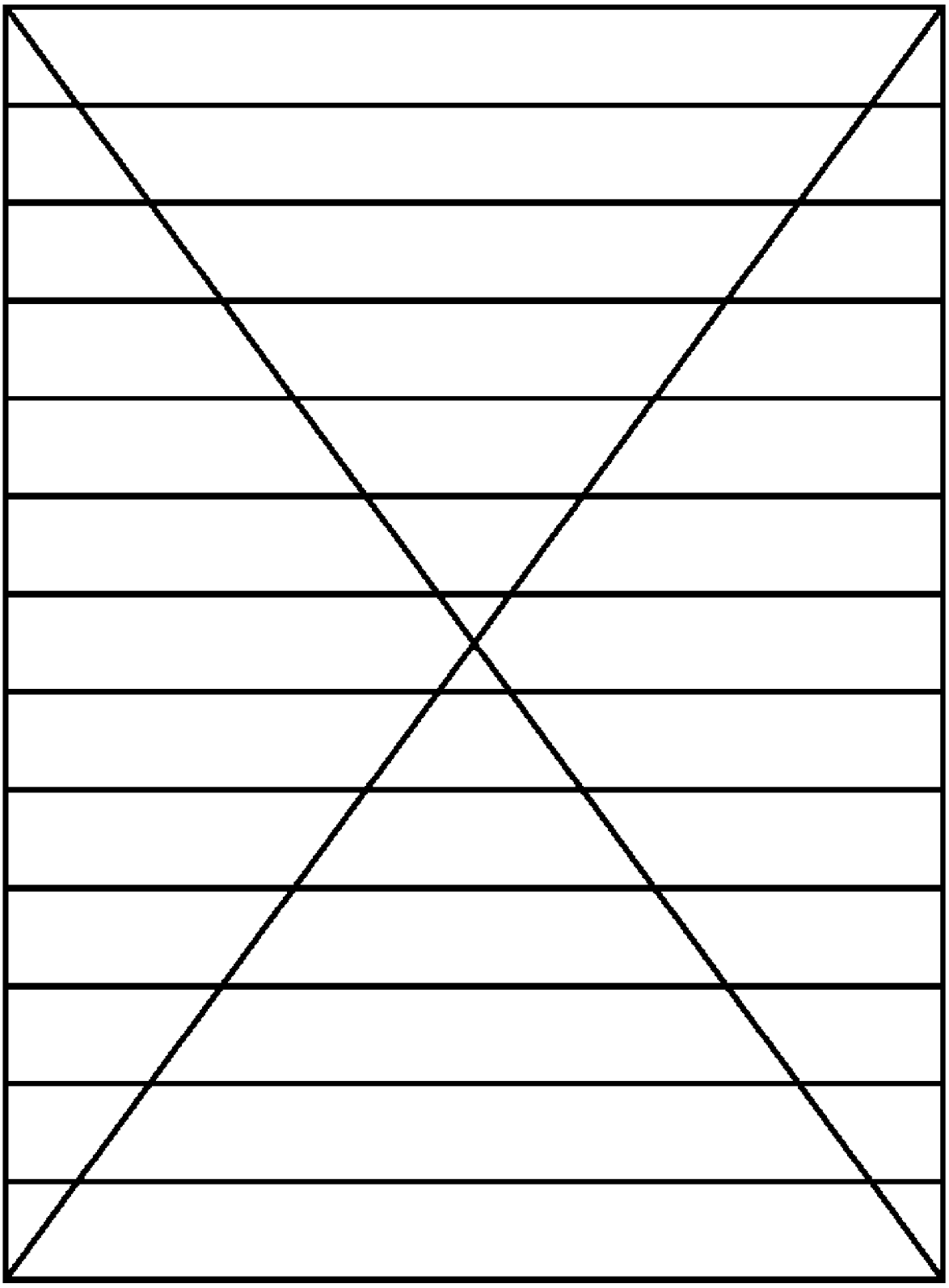

Check the separation roller.
Confirm whether the roller is dirty or not and is attached correctly.
(Refer to **DISASSEMBLY INSTRUCTIONS**.)
OK?
NO
Clean or replace the defective parts.
(Refer to **MAINTENANCE** or
DISASSEMBLY INSTRUCTIONS.)
OK?
OK
END
NG
YES
Check if the separation
spring is distorted?
Check the separation
spring.
OK?
NG
Replace the separation
spring.
OK
Check whether the separation spring is deformed.
Also check whether the height is normal.
Check each of the rollers.
OK?
NG
Replace the defective roller.
Check that the Separation roller and the Document
feed rollers are attached correctly by a visual check.
END

Fig. B

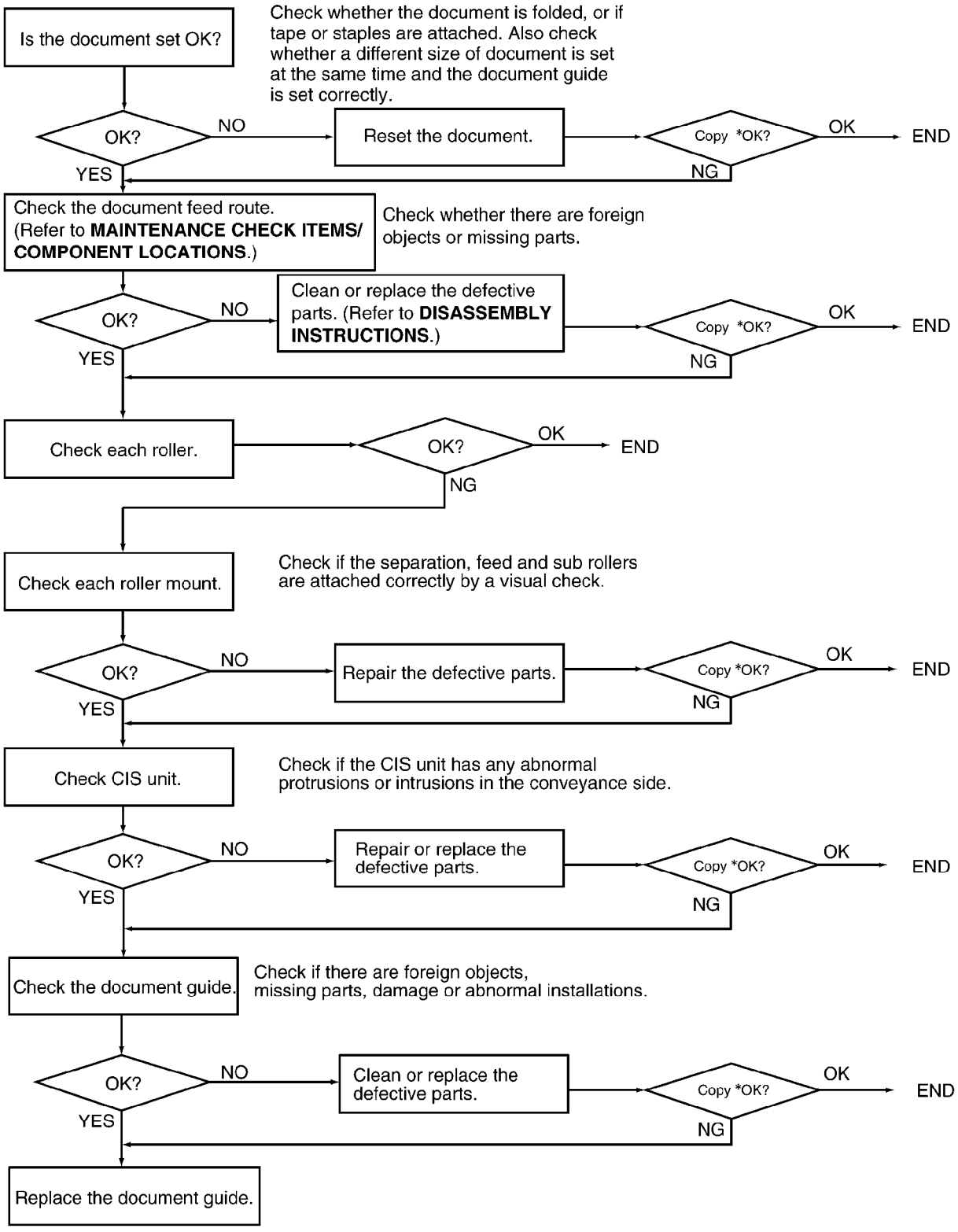


CROSS REFERENCE:
MAINTENANCE CHECK ITEMS/COMPONENT LOCATIONS(
)
DISASSEMBLY INSTRUCTIONS(
)

Note:

When confirming if the characters are extended or distorted, or if the feed problem is occurred, use this test chart format
(Fig. B).

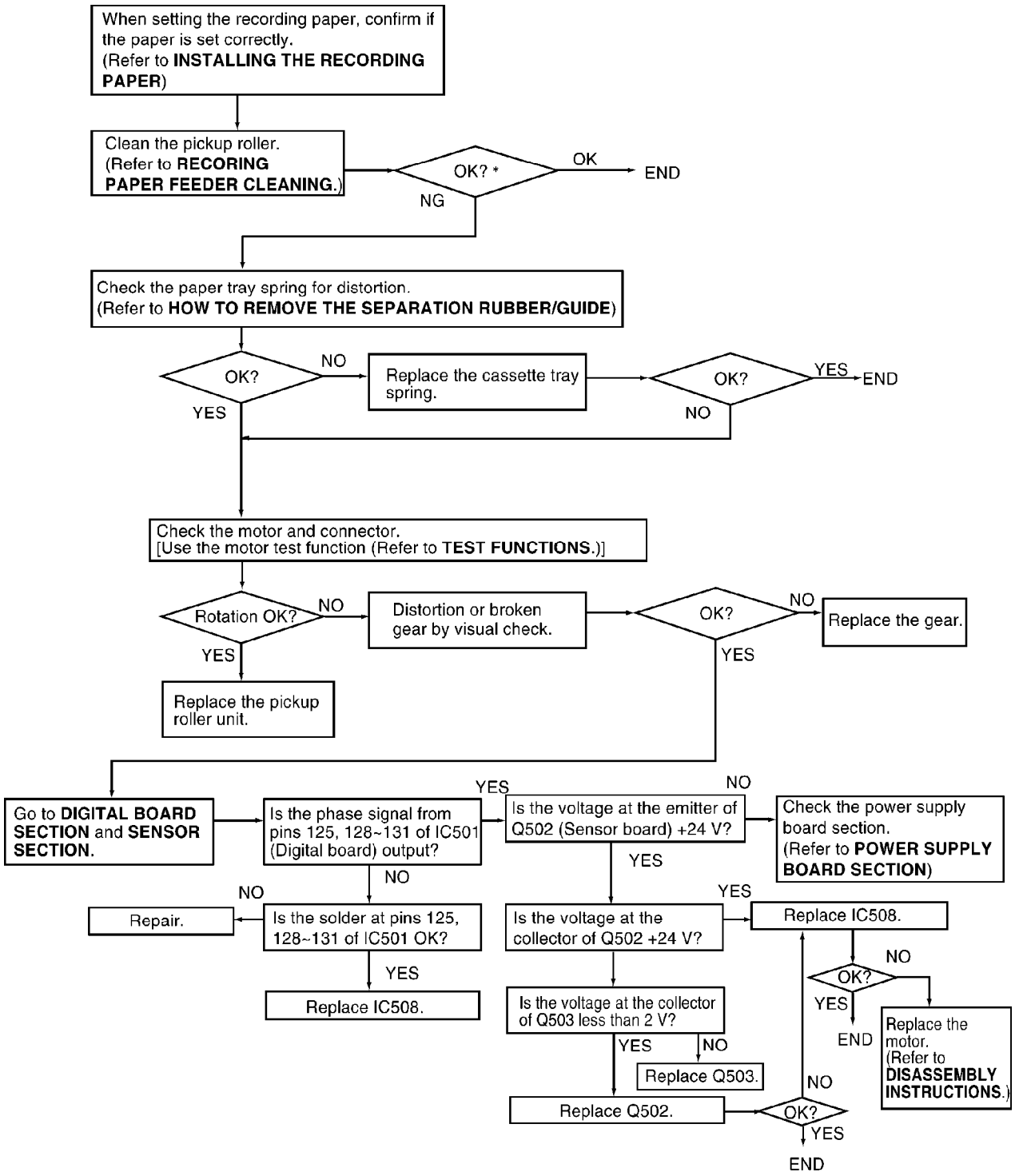
6.7.4.4. Document Skew


Is the document set OK?
Check whether the document is folded, or if tape or staples are attached. Also check whether a different size of document is set at the same time and the document guide is set correctly.
OK?
NO
YES
Reset the document.
Copy *OK?
OK
NG
END
Check the document feed route. (Refer to **MAINTENANCE CHECK ITEMS/ COMPONENT LOCATIONS**.)
Check whether there are foreign objects or missing parts.
OK?
NO
YES
Clean or replace the defective parts. (Refer to **DISASSEMBLY INSTRUCTIONS**.)
Copy *OK?
OK
NG
END
Check each roller.
OK?
OK
NG
END
Check each roller mount.
Check if the separation, feed and sub rollers are attached correctly by a visual check.
OK?
NO
YES
Repair the defective parts.
Copy *OK?
OK
NG
END
Check CIS unit.
Check if the CIS unit has any abnormal protrusions or intrusions in the conveyance side.
OK?
NO
YES
Repair or replace the defective parts.
Copy *OK?
OK
NG
END
Check the document guide.
Check if there are foreign objects, missing parts, damage or abnormal installations.
OK?
NO
YES
Clean or replace the defective parts.
Copy *OK?
OK
NG
END
Replace the document guide.

*** We recommend making a copy of the Fig. B document in Multiple Document Feed ( ) and using it.**

CROSS REFERENCE:
MAINTENANCE CHECK ITEMS/COMPONENT LOCATIONS( )
DISASSEMBLY INSTRUCTIONS( )

6.7.4.5. The Recording Paper Does not Feed

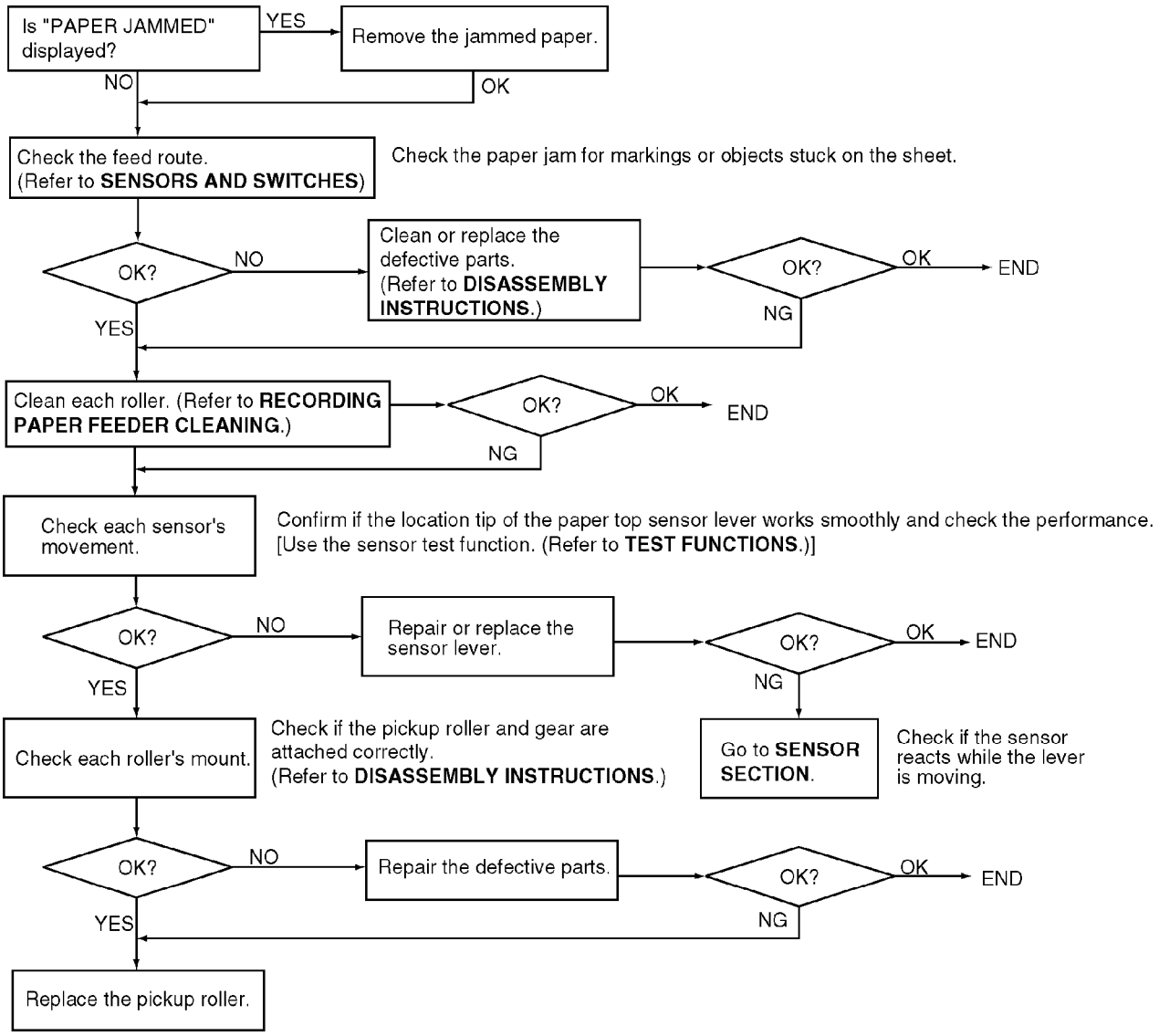


*** We recommend making a copy of the Fig. B document in Multiple Document Feed ( )and using it.**

CROSS REFERENCE:

INSTALLING THE RECORDING PAPER(
)
Recording paper feeder cleaning (Pick up roller cleaning)(
)
How to Remove the SEPARATION RUBBER/HOLDER(
)
DIGITAL BOARD SECTION(
)
POWER SUPPLY BOARD SECTION(
)
SENSOR SECTION(
)
TEST FUNCTIONS(
)
DISASSEMBLY INSTRUCTIONS(
)
OPERATION PANEL SECTION(
)

6.7.4.6. Paper Jam



CROSS REFERENCE:

SENSOR SECTION(

)

TEST FUNCTIONS(

)

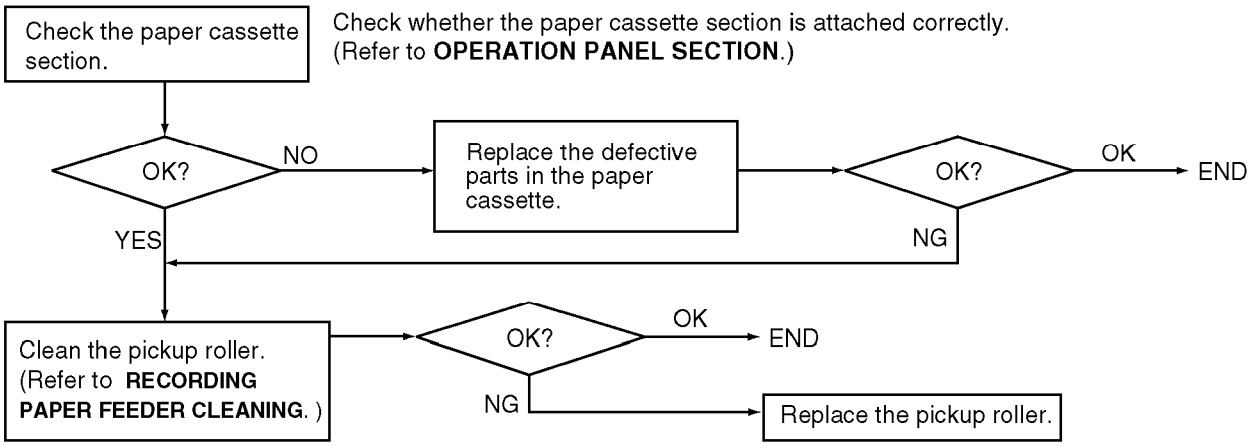
DISASSEMBLY INSTRUCTIONS(

)

SENSORS AND SWITCHES(

)

6.7.4.7. Recording Paper Multiple Feed and Skew



CROSS REFERENCE:

Recording paper feeder cleaning (Pick up roller cleaning)(

)

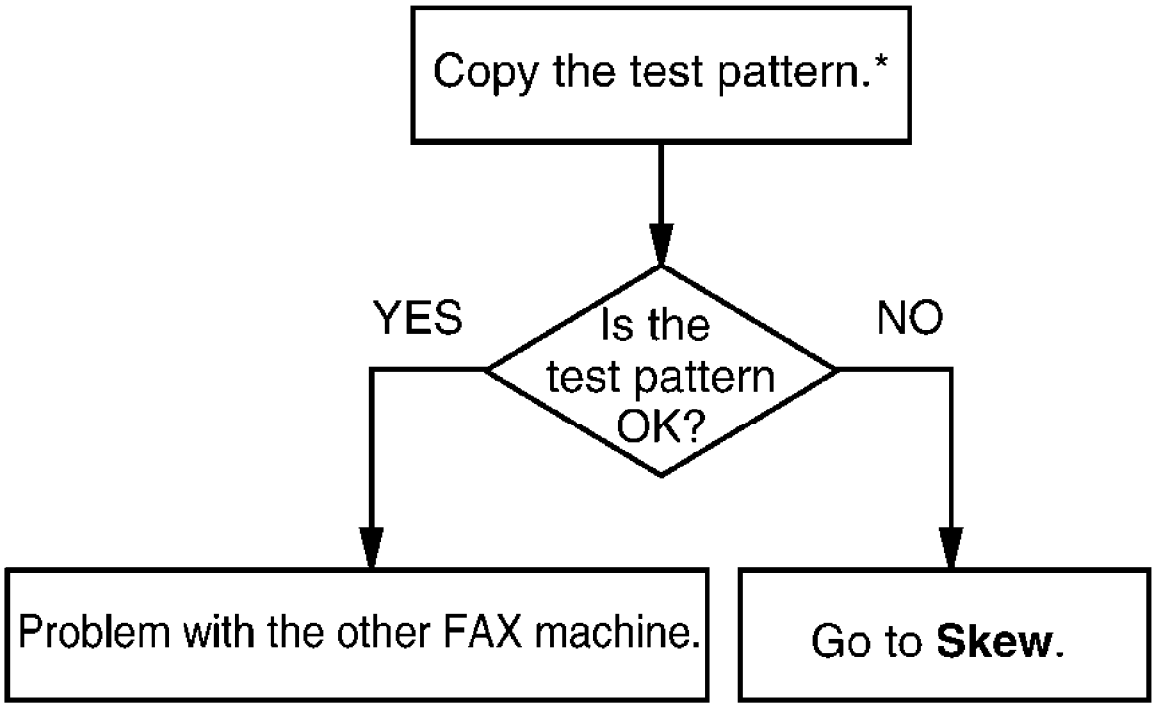
DISASSEMBLY INSTRUCTIONS(

)

OPERATION PANEL SECTION(

)

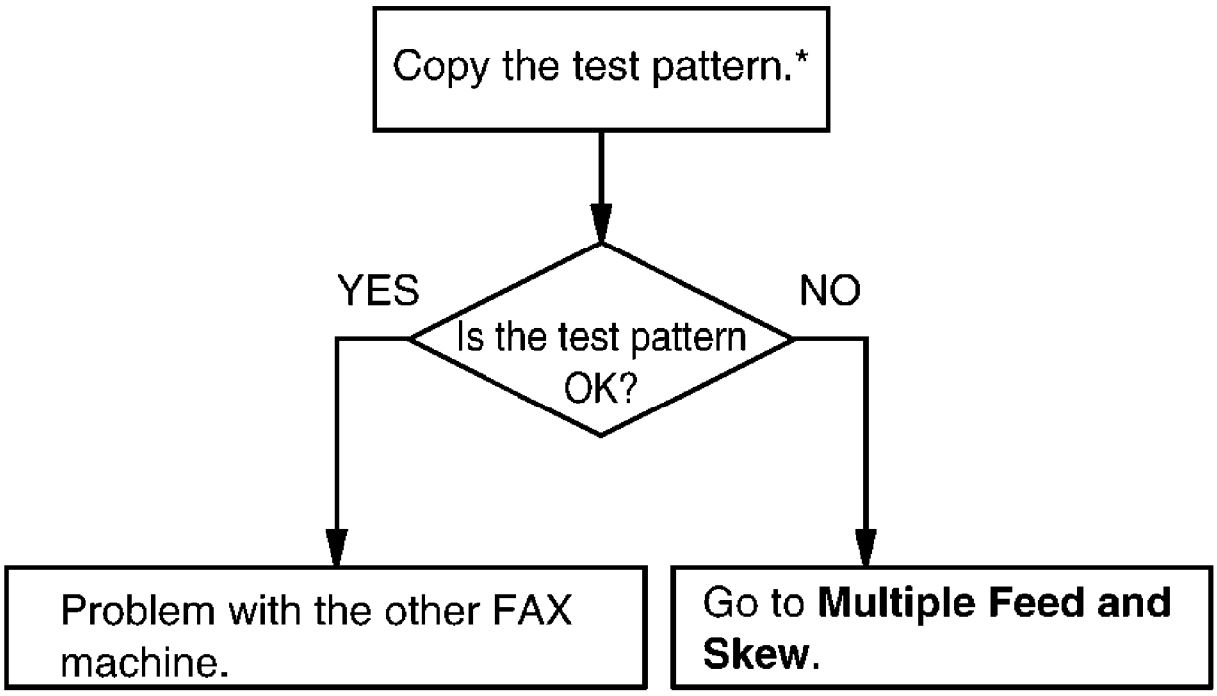
6.7.4.8. The sent fax data is skewed



*** We recommend making a copy of the Fig. B document in Multiple Document Feed( ) and using it.**

CROSS REFERENCE:
Document Skew( )

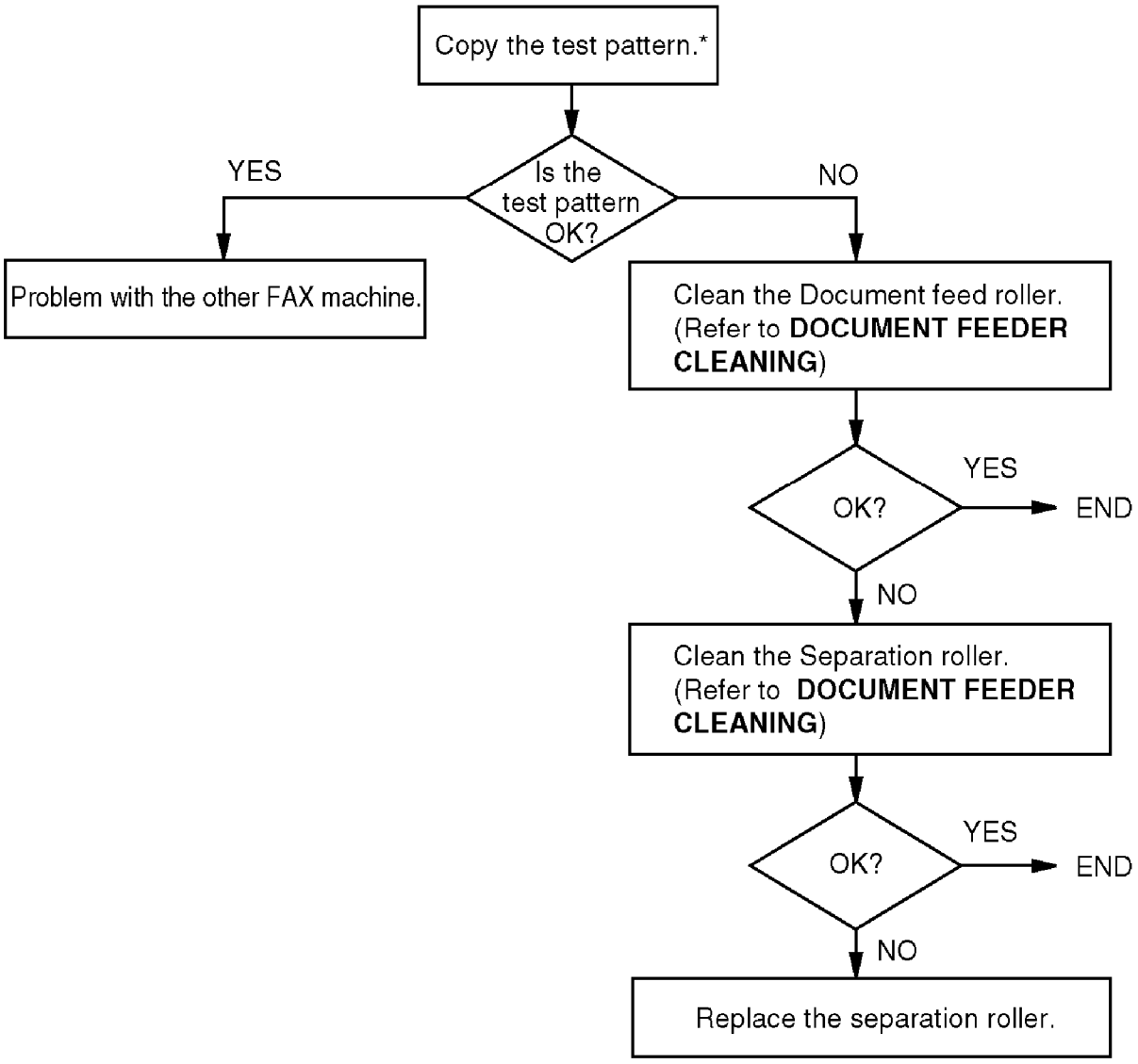
6.7.4.9. The received fax data is skewed



*** We recommend making a copy of the Fig. B document in Multiple Document Feed( ) and using it.**

CROSS REFERENCE:
Recording Paper Multiple Feed and Skew( )

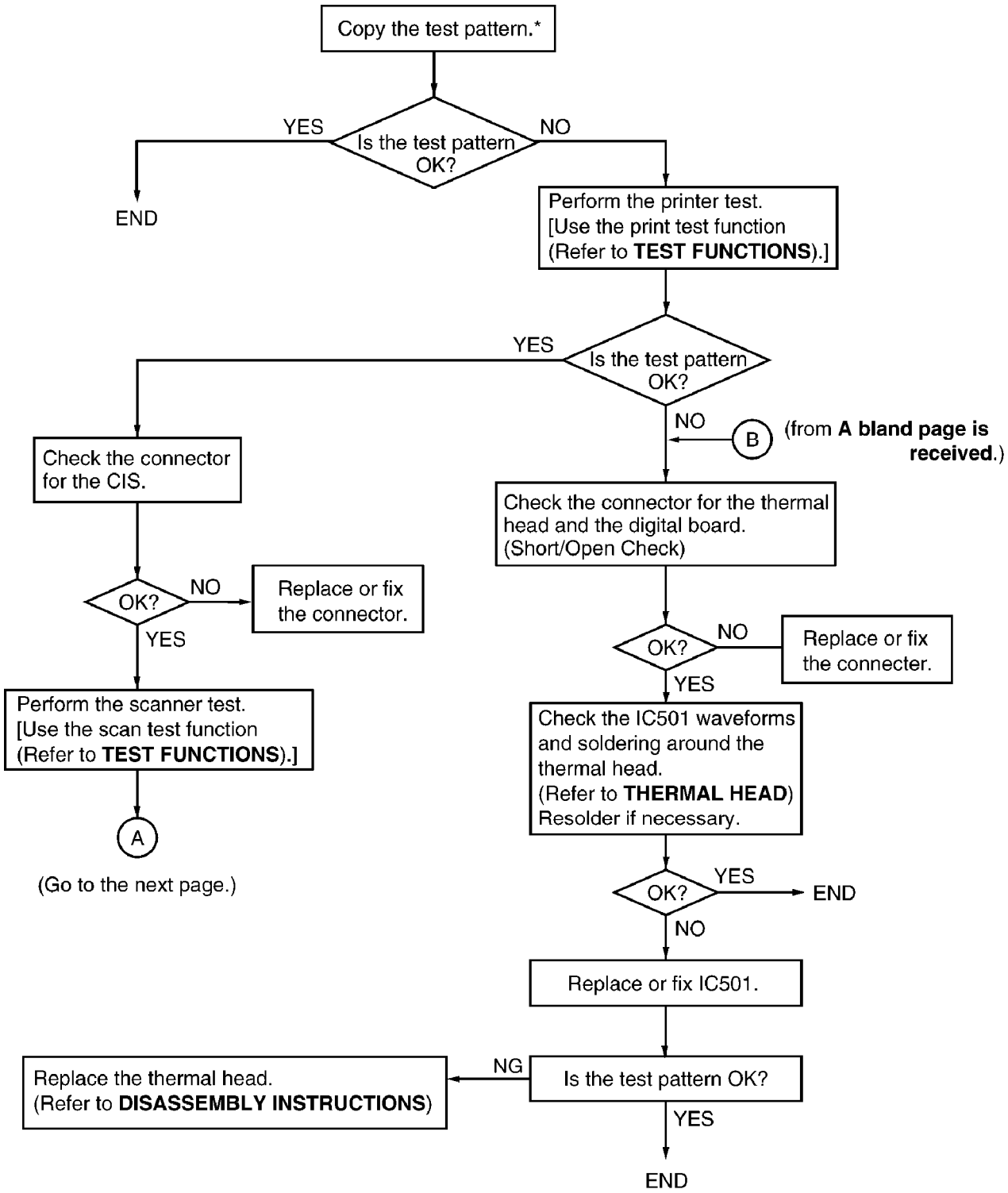
6.7.4.10. Received or copied data is expanded



*** We recommend making a copy of the Fig. B document in Multiple Document Feed( ) and using it.**

CROSS REFERENCE:
Document feeder/scanner glass cleaning (Separation roller cleaning)( )

6.7.4.11. A blank page is copied



*** We recommend making a copy of the Fig. B document in Multiple Document Feed ( ) and using it.**

CROSS REFERENCE:

A blank page is received(
)
TEST FUNCTIONS(
)
DISASSEMBLY INSTRUCTIONS(
)
THERMAL HEAD(
)

(From the previous)

A

Is the pin 3 of CN503 at 3 ~ 3.3 V?

NO

Is the pin 34 of IC501 at 0V?

YES

NO

YES

Check the solder of IC501.

OK

Replace IC501.

Check Q520, R556, R682, R683 and C699.

Is the amplitude at pins 4, 5 of CN 01 (CIS) 3 ~ 3.3 Vp-p?

NO

YES

Take out CN01 (CIS), and check the amplitude at pins 4, 5 CN503 (Digital board). (3 ~ 3.3 Vp-p)

Check the waveform at pin 1 of CN01 (CIS). (Refer to Fig. C.)

OK

NG

OK

NG

Check the solder at pins 15,16 of IC501 (Digital board).

END

Check whether the LED on the CIS turns on.

YES

Replace the CIS.

OK

Replace IC501.

NO

Check the amplitude at pin 6 CN503 (Digital board).

OK

NG

Check the amplitude Q507 (B).

OK

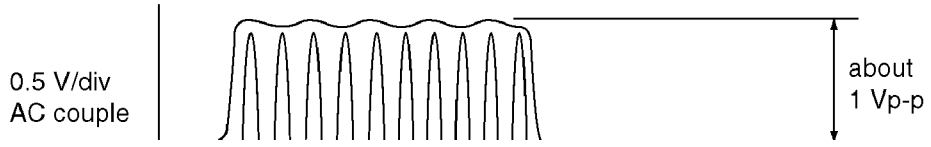
Replace Q507.

NG

Check the solder at pin 21 of IC501 (Digital board).

OK

Replace IC501.



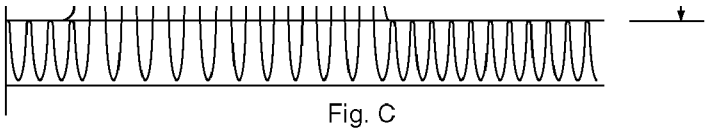
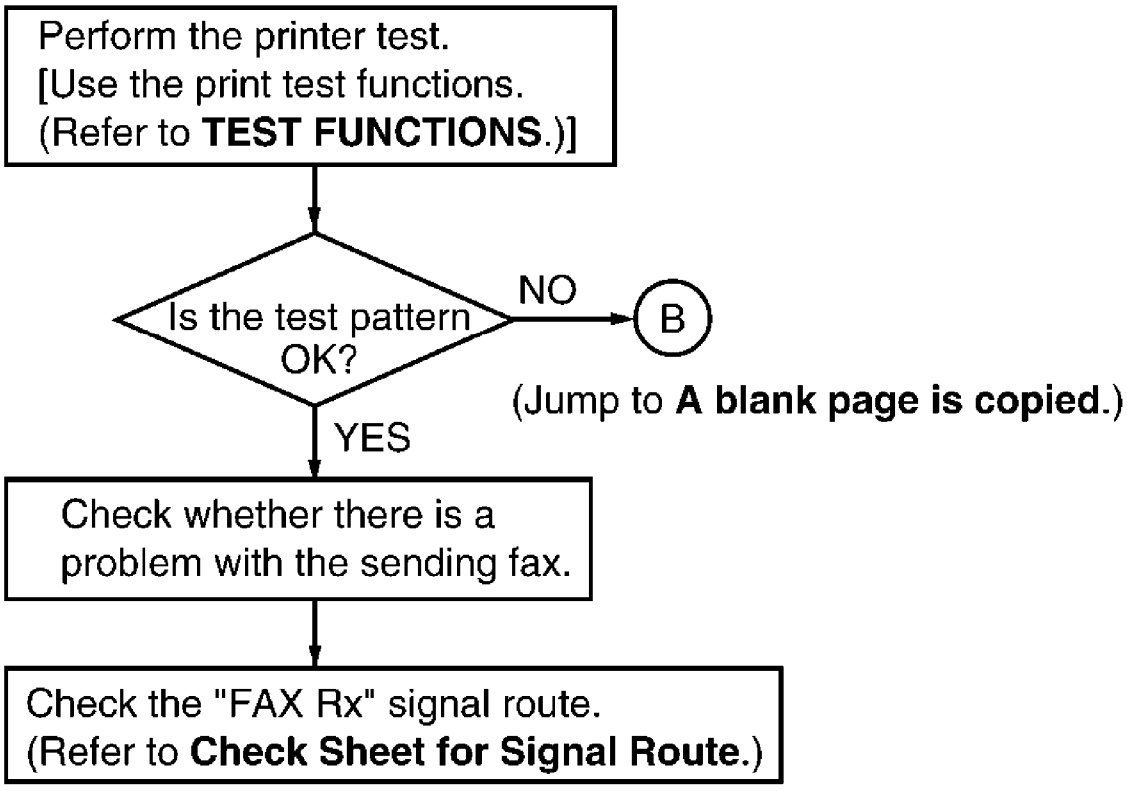


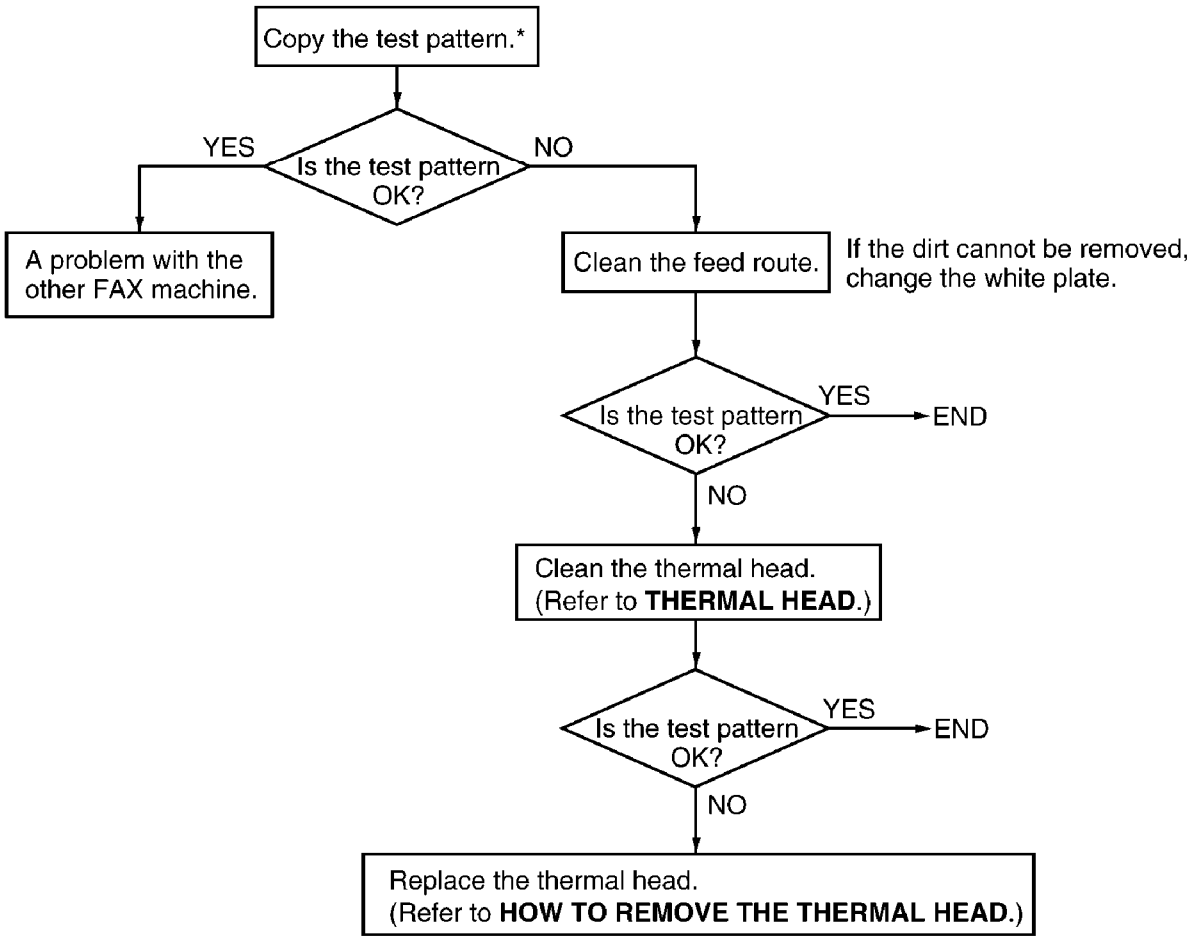
Fig. C

6.7.4.12. A blank page is received


Perform the printer test.
[Use the print test functions.
(Refer to TEST FUNCTIONS.)]
Is the test pattern OK?
NO
B
(Jump to A blank page is copied.)
YES
Check whether there is a problem with the sending fax.
Check the "FAX Rx" signal route.
(Refer to Check Sheet for Signal Route.)

CROSS REFERENCE:
A blank page is copied(
)
Check Sheet for Signal Route(
)
TEST FUNCTIONS(
)

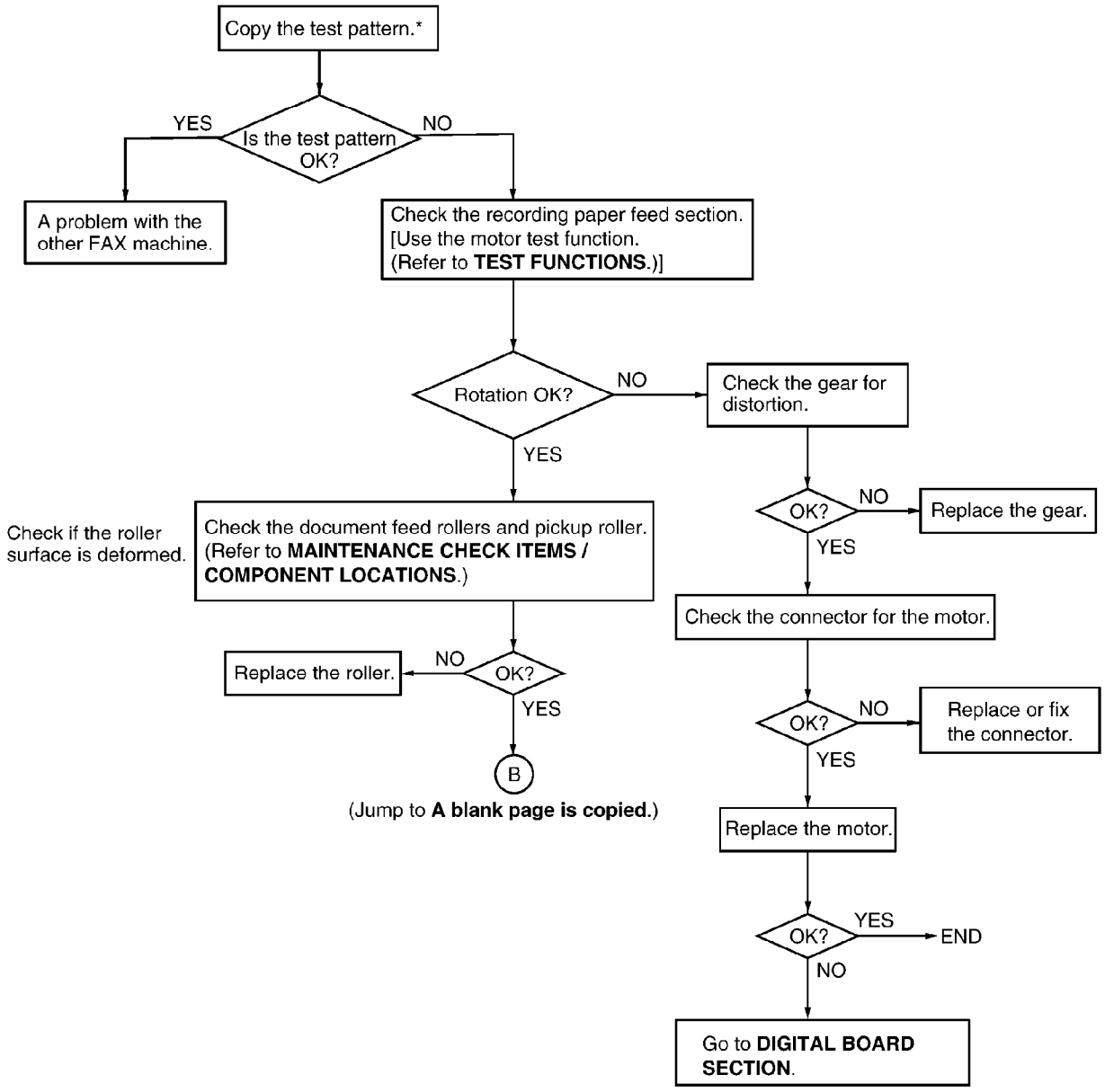
6.7.4.13. Black or white vertical line on print out


Copy the test pattern.*
Is the test pattern OK?
YES
NO
A problem with the other FAX machine.
Clean the feed route.
If the dirt cannot be removed, change the white plate.
Is the test pattern OK?
YES
END
NO
Clean the thermal head. (Refer to **THERMAL HEAD**.)
Is the test pattern OK?
YES
END
NO
Replace the thermal head. (Refer to **HOW TO REMOVE THE THERMAL HEAD**.)

*** We recommend making a copy of the Fig. B document in Multiple Document Feed ( ) and using it.**

CROSS REFERENCE:
THERMAL HEAD( )
How to Remove the THERMAL HEAD( )

6.7.4.14. Black or white lateral line on print out



*** We recommend making a copy of the Fig. B document in Multiple Document Feed( ) and using it.**

CROSS REFERENCE:

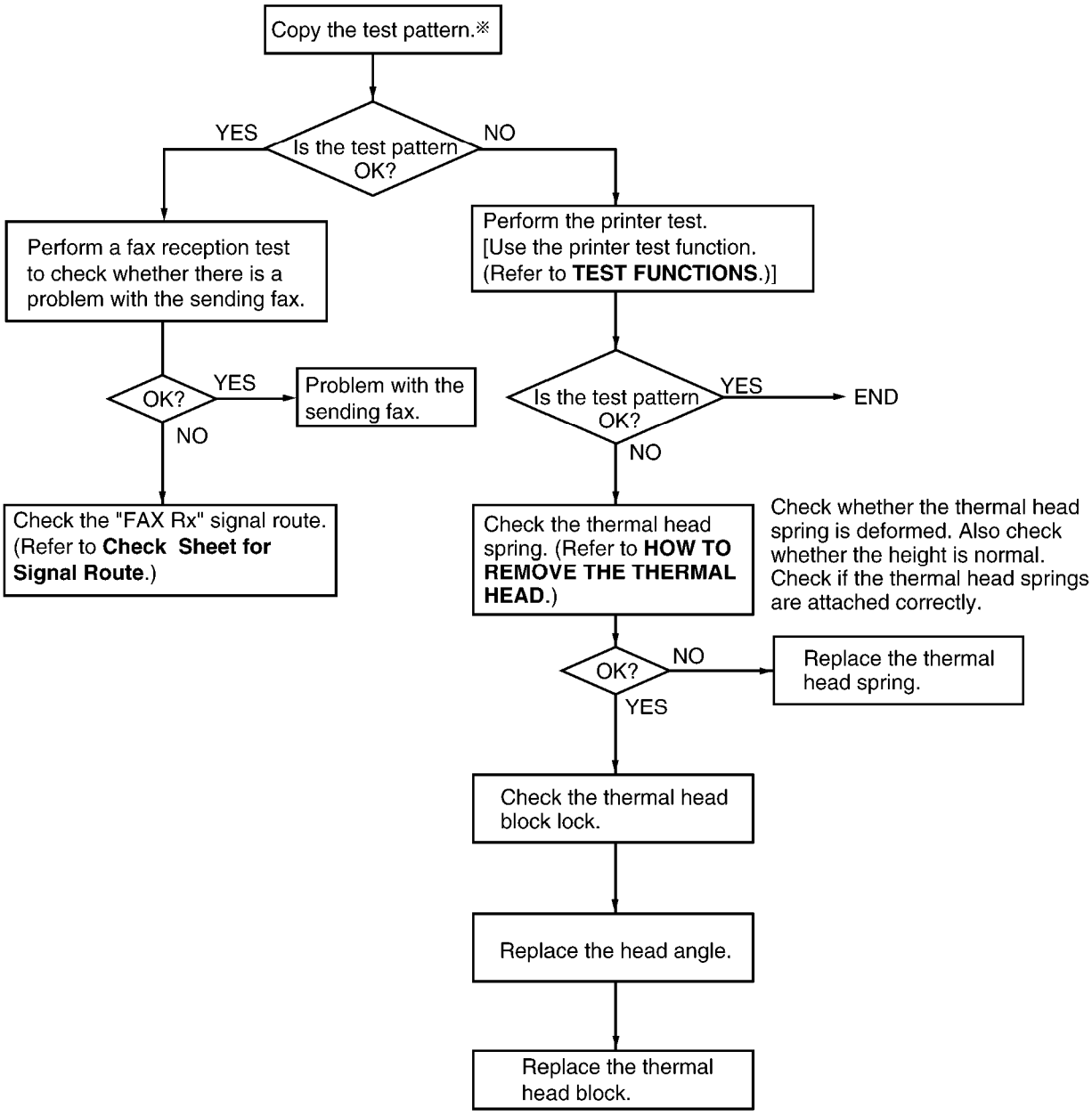
A blank page is copied( )

DIGITAL BOARD SECTION( )

TEST FUNCTIONS( )

MAINTENANCE CHECK ITEMS/COMPONENT LOCATIONS( )

6.7.4.15. An abnormal image is printed


Copy the test pattern.※
Is the test pattern OK?
YES
NO
Perform a fax reception test to check whether there is a problem with the sending fax.
OK?
YES
Problem with the sending fax.
NO
Check the "FAX Rx" signal route. (Refer to **Check Sheet for Signal Route**.)
Perform the printer test. [Use the printer test function. (Refer to **TEST FUNCTIONS**.)]
Is the test pattern OK?
YES
END
NO
Check the thermal head spring. (Refer to **HOW TO REMOVE THE THERMAL HEAD**.)
Check whether the thermal head spring is deformed. Also check whether the height is normal. Check if the thermal head springs are attached correctly.
OK?
NO
Replace the thermal head spring.
YES
Check the thermal head block lock.
Replace the head angle.
Replace the thermal head block.

*** We recommend making a copy of the Fig. B document in Multiple Document Feed ( ) and using it.**

CROSS REFERENCE:

Check Sheet for Signal Route(
)
TEST FUNCTIONS(
)
How to Remove the THERMAL HEAD(
)

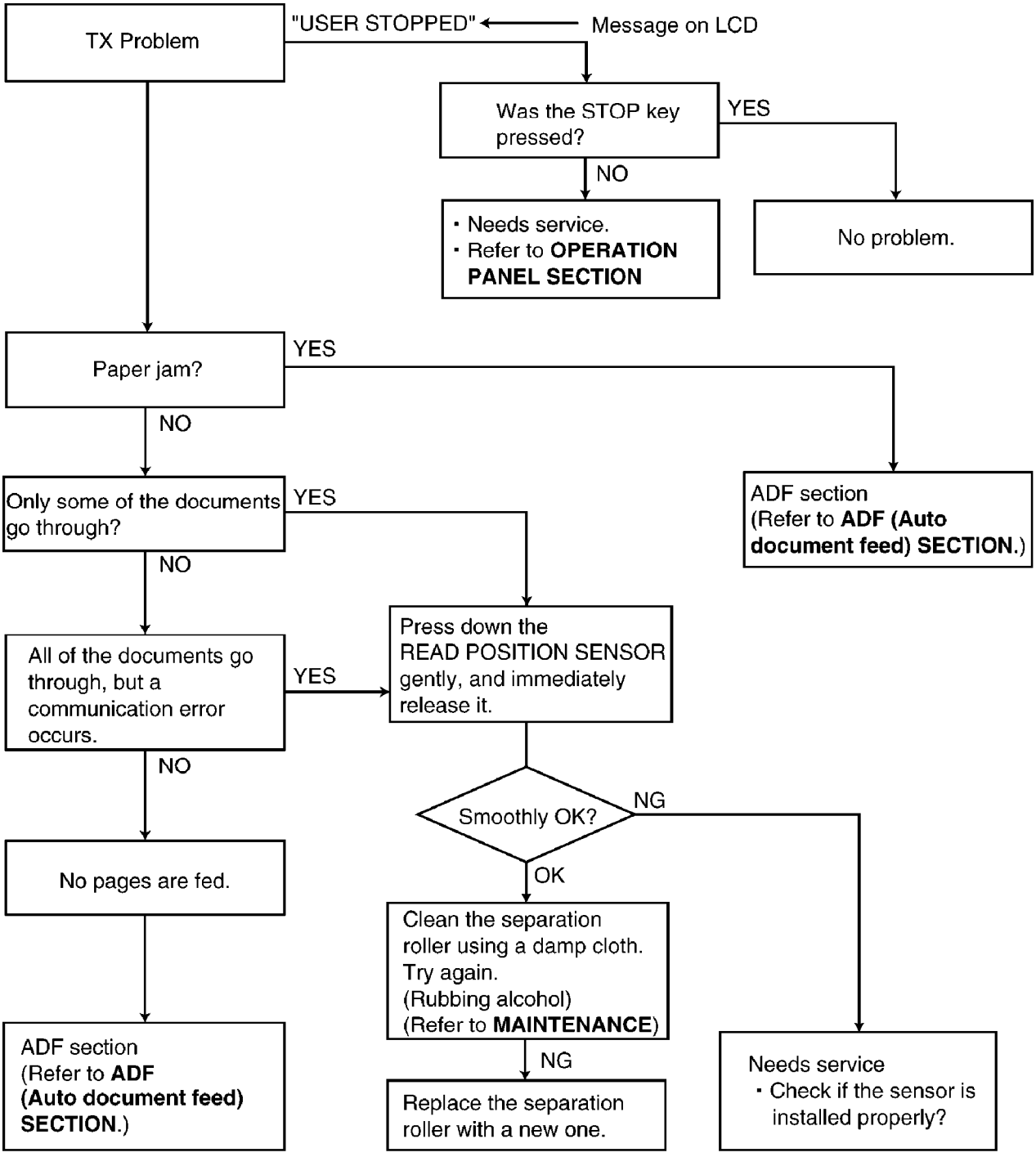
6.7.5. COMMUNICATION SECTION

**Find the problem in the table shown below, and refer to the corresponding troubleshooting procedure in Defective Facsimile Section (
).**

No.	Symptom	Content	Possible cause
1	The paper is not fed properly when faxing. (Nor in the copy mode.)	Troubleshooting	Problem with the feeding mechanism.
2	The fax usually transmits successfully but sometimes fails. (The unit can copy documents.)	Troubleshooting	Problem with the service line or with the receiver's fax.
3	The fax usually receives successfully but sometimes fails. (The unit can copy documents.)	Troubleshooting	Problem with the service line or with the transmitter's fax.
4	The fax completely fails to transmit or receive. (The unit can copy documents.)	Troubleshooting	Problem with the electric circuit.
5	The fax fails either to transmit or receive when making a long distance or an international call. (The unit can copy documents.)	Detailed description of the possible causes (Similar to troubleshooting items No.2 and No.3.)	Problem with the service line.
6	The fax image is poor when transmitting or receiving during a long distance or an international call.		
7	No.1-No.5	The troubleshooting procedure for each error code will be printed on the communication result report.	

6.7.5.1. Defective Facsimile Section

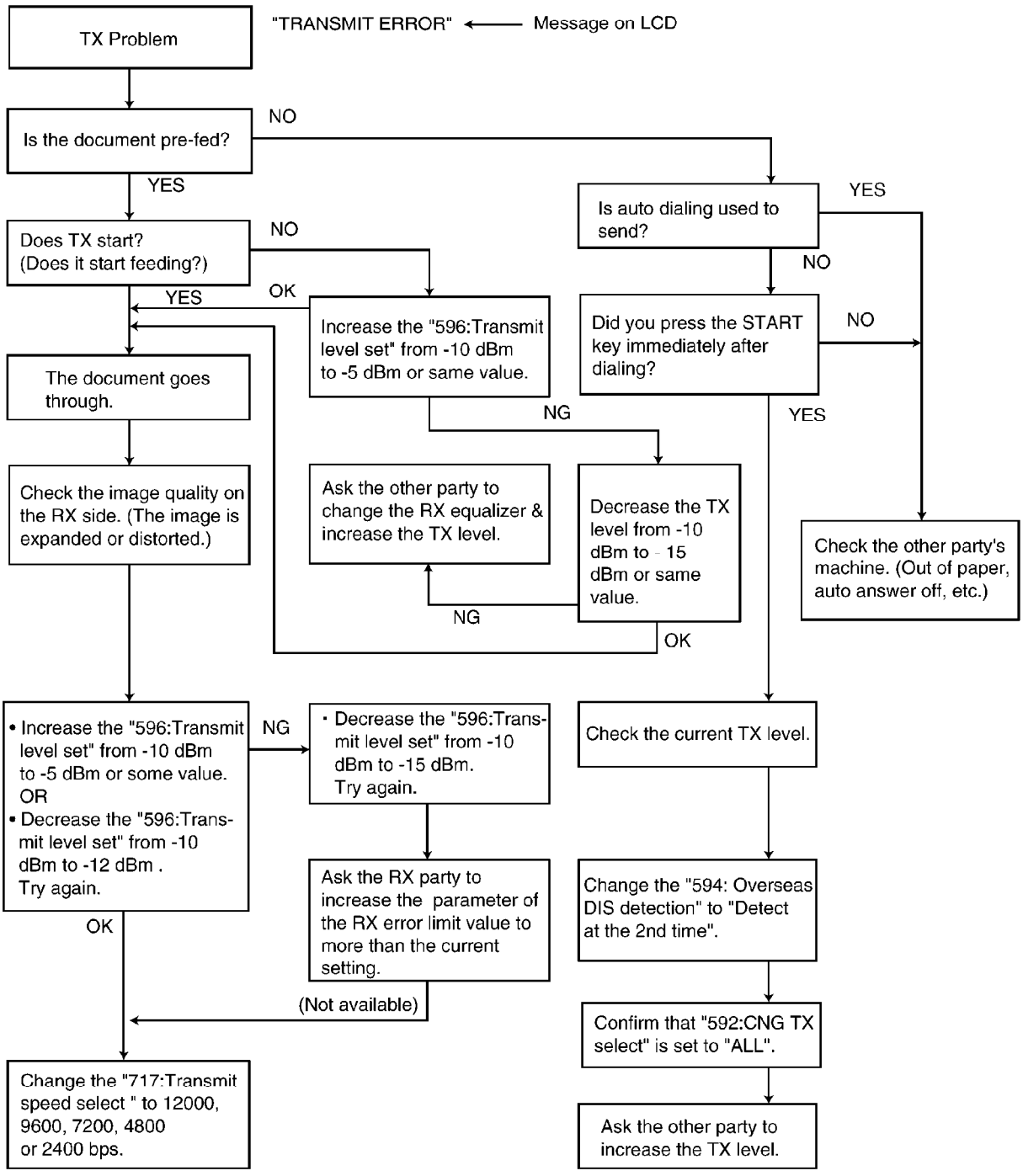
6.7.5.1.1. Transmit Problem


TX Problem
"USER STOPPED"
Message on LCD
Was the STOP key pressed?
YES
NO
• Needs service.
• Refer to OPERATION PANEL SECTION
No problem.
Paper jam?
YES
NO
ADF section (Refer to ADF (Auto document feed) SECTION.)
Only some of the documents go through?
YES
NO
All of the documents go through, but a communication error occurs.
YES
NO
Press down the READ POSITION SENSOR gently, and immediately release it.
Smoothly OK?
NG
OK
No pages are fed.
Clean the separation roller using a damp cloth. Try again. (Rubbing alcohol) (Refer to MAINTENANCE)
NG
ADF section (Refer to ADF (Auto document feed) SECTION.)
Replace the separation roller with a new one.
Needs service
• Check if the sensor is installed properly?

CROSS REFERENCE:
MAINTENANCE(
)

ADF (Auto Document Feed) AND PAPER FEED SECTION(
)
OPERATION PANEL SECTION(
)

6.7.5.1.2. Sometime there is a transmit problem


TX Problem
"TRANSMIT ERROR" ← Message on LCD
Is the document pre-fed?
NO
YES
Does TX start?
(Does it start feeding?)
NO
YES
OK
Increase the "596:Transmit level set" from -10 dBm to -5 dBm or same value.
The document goes through.
Check the image quality on the RX side. (The image is expanded or distorted.)
• Increase the "596:Transmit level set" from -10 dBm to -5 dBm or some value.
OR
• Decrease the "596:Transmit level set" from -10 dBm to -12 dBm .
Try again.
NG
• Decrease the "596:Transmit level set" from -10 dBm to -15 dBm.
Try again.
OK
Ask the RX party to increase the parameter of the RX error limit value to more than the current setting.
(Not available)
Change the "717:Transmit speed select " to 12000, 9600, 7200, 4800 or 2400 bps.
Is auto dialing used to send?
YES
NO
Did you press the START key immediately after dialing?
NO
YES
NG
Ask the other party to change the RX equalizer & increase the TX level.
Decrease the TX level from -10 dBm to - 15 dBm or same value.
NG
OK
Check the other party's machine. (Out of paper, auto answer off, etc.)
Check the current TX level.
Change the "594: Overseas DIS detection" to "Detect at the 2nd time".
Confirm that "592:CNG TX select" is set to "ALL".
Ask the other party to increase the TX level.

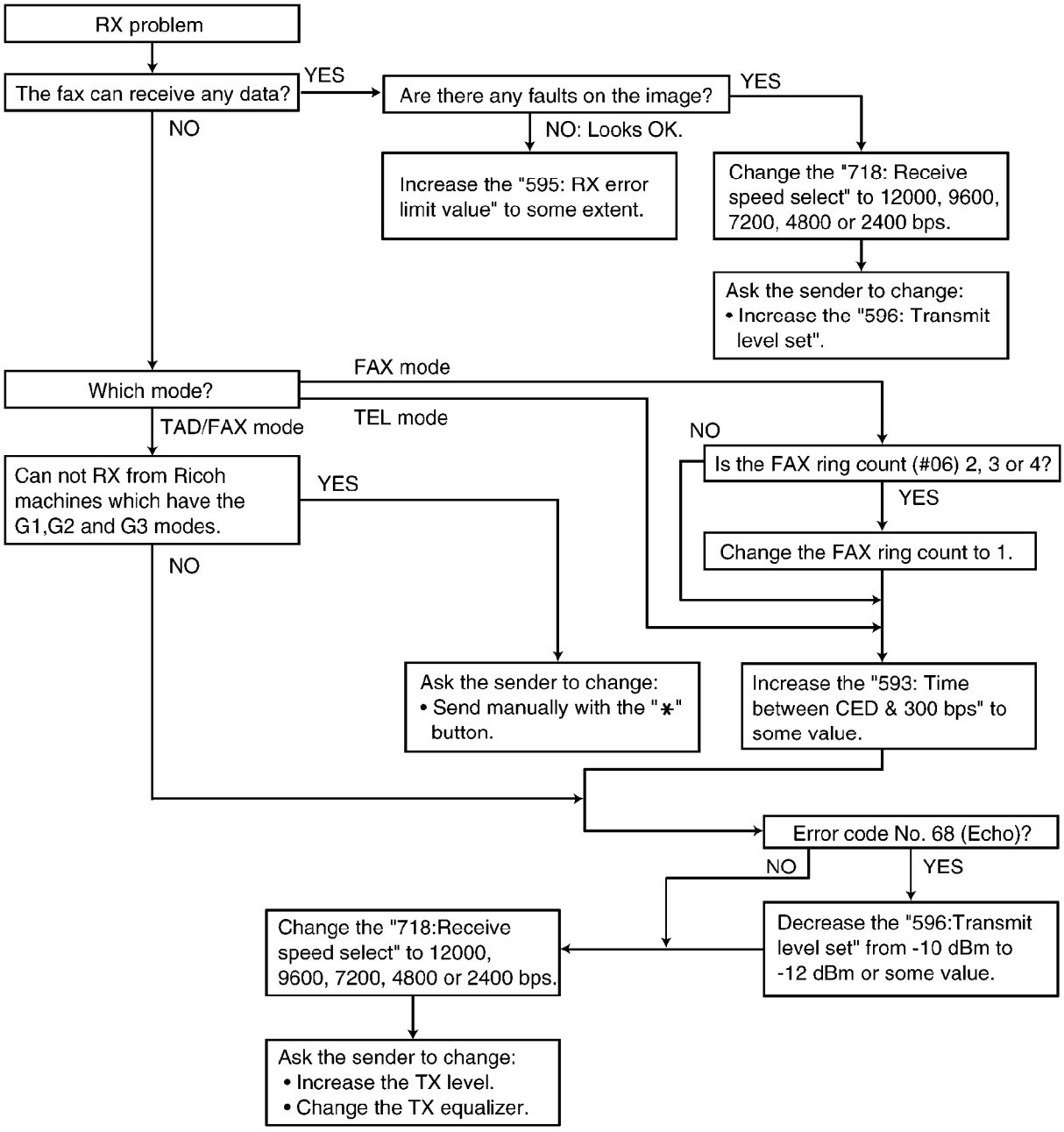
Note:

"596: Transmit level set" represents a service code. (Refer to SERVICE FUNCTION TABLE(

).)

6.7.5.1.3. Receive Problem

First confirm whether the recording paper is installed properly or not before starting troubleshooting. (Refer to "Remarks".)

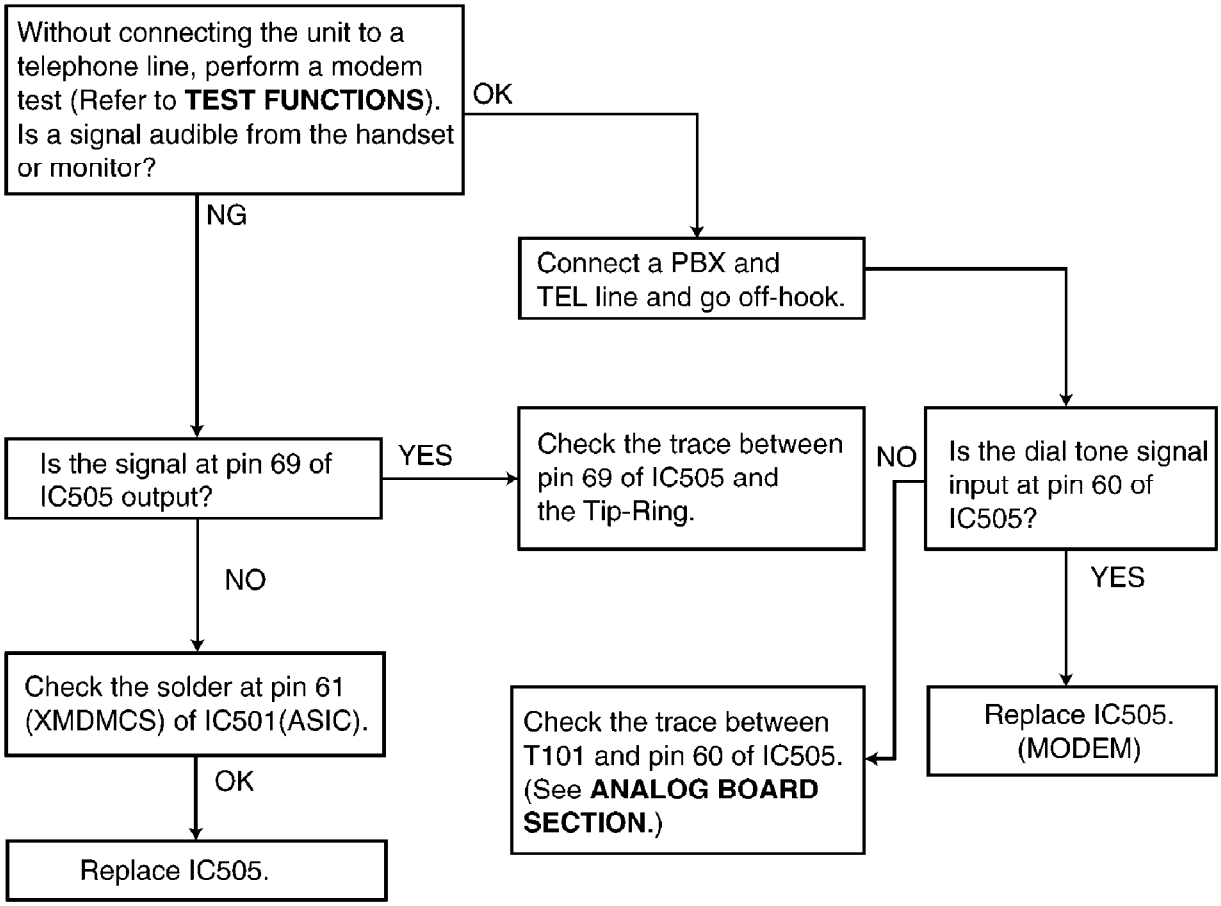

RX problem
The fax can receive any data?
YES
NO
Are there any faults on the image?
YES
NO: Looks OK.
Increase the "595: RX error limit value" to some extent.
Change the "718: Receive speed select" to 12000, 9600, 7200, 4800 or 2400 bps.
Ask the sender to change:
• Increase the "596: Transmit level set".
Which mode?
FAX mode
TEL mode
TAD/FAX mode
NO
Is the FAX ring count (#06) 2, 3 or 4?
YES
Change the FAX ring count to 1.
Can not RX from Ricoh machines which have the G1,G2 and G3 modes.
YES
NO
Ask the sender to change:
• Send manually with the "*" button.
Increase the "593: Time between CED & 300 bps" to some value.
Error code No. 68 (Echo)?
NO
YES
Change the "718:Receive speed select" to 12000, 9600, 7200, 4800 or 2400 bps.
Decrease the "596:Transmit level set" from -10 dBm to -12 dBm or some value.
Ask the sender to change:
• Increase the TX level.
• Change the TX equalizer.

Note:

**"596: Transmit level set" represents a service code. (Refer to SERVICE FUNCTION TABLE(
).)**

Remarks:
Regarding the reception problem, we have investigated the conceivable causes in the flow chart except for the software-related errors. However, some troubles may occur due to the software-related problems such as "OUT OF PAPER" when the fax switches to the memory receiving mode and the memory capacity becomes full of the unprintable data. In this case, error messages [MEMORY FULL] and its main cause, for example "CHECK PAPER" are displayed on the LCD. Once you solve the main problem, [MEMORY FULL] will be cancelled and the reception problem will be resolved.
LCD display messages indicating the error causes are shown below.
CHECK PAPER
COVER OPEN
UNIT OVERHEATED (COVER OPEN, etc.)...Reset the unit.
PAPER JAMMED
CHECK FILM
**Please refer to USER RECOVERABLE ERRORS (
) for the above items. If it turns out to be a hardware deformity, please check each sensor. (Refer to TEST FUNCTIONS (
).)**

6.7.5.1.4. The unit can copy, but cannot transmit/receive


Without connecting the unit to a telephone line, perform a modem test (Refer to **TEST FUNCTIONS**). Is a signal audible from the handset or monitor?
OK
NG
Connect a PBX and TEL line and go off-hook.
Is the signal at pin 69 of IC505 output?
YES
Check the trace between pin 69 of IC505 and the Tip-Ring.
NO
Is the dial tone signal input at pin 60 of IC505?
NO
YES
Check the solder at pin 61 (XMDMCS) of IC501(ASIC).
Check the trace between T101 and pin 60 of IC505. (See **ANALOG BOARD SECTION**.)
Replace IC505. (MODEM)
OK
Replace IC505.

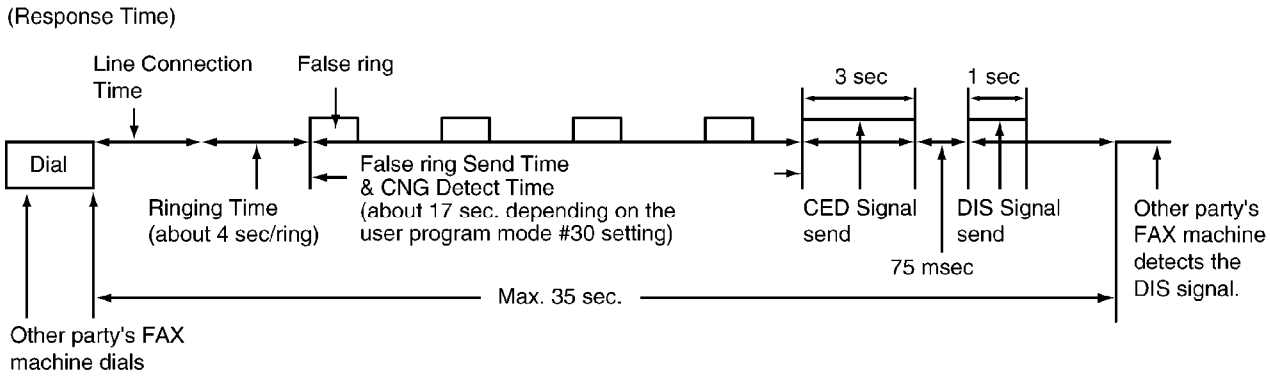
CROSS REFERENCE:
ANALOG BOARD SECTION(
)
TEST FUNCTIONS(
)

6.7.5.1.5. The unit can copy, but cannot either transmit/receive long distance or international communications

The following two causes can be considered for this symptom.

Cause 1:
The other party is executing automatic dialing, the call has been received by this unit, and the CED or DIS signal response time is too long. (In most cases, this unit detects the CNG signal and can respond to CED or DIS.) (According to the ITU-T standard, the communication procedure is cancelled when there is no response

from the other party within 35 sec, so that the other party releases the line.)



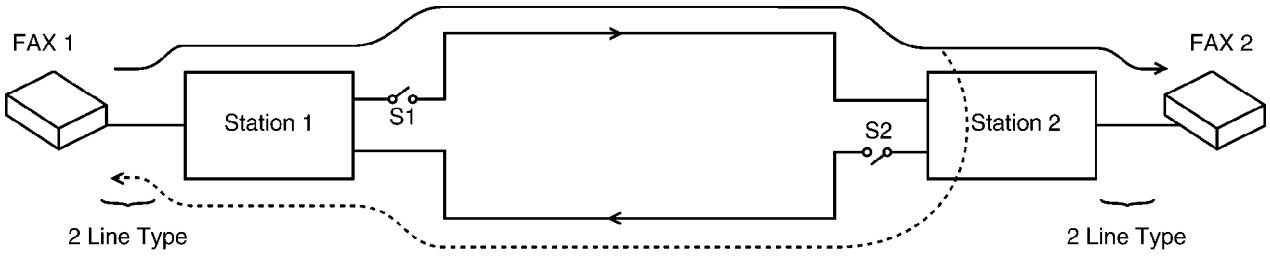
(Cause and Countermeasure)

As shown in the chart above, the total handshaking time must be reduced, but because of the long distance connection and linking of several stations, the line connection time cannot be reduced. Accordingly, the following countermeasures should be tried.

(A)... As the 35 sec. count is started directly after dialing or directly after the START button has been pressed for models with a START button, the other party should be called manually, if possible. Another possibility is entering two pauses at the end of the auto dial number on the transmission side. Then the count start time can be delayed for 2 pauses (about 10 sec.).

Cause 2:

Erroneous detection because of an echo or an echo canceler.



(Echo/Echo Canceler)

The signal from FAX1 reaches FAX2 via stations 1 and 2, but the reflection signal at station 2 also returns via station 1 (echo). As the distance between station 1 and station 2 is far, the echo returns to FAX 1 at a max of 600 msec after transmission.

There is a possibility that this signal is detected erroneously as the signal from FAX2. For a normal call, there is also a possibility that the echo of their own voice will make the call difficult to understand. For this reason, each station (station 1 and station 2) attaches echo cancelers (S1 and S2) for international lines or long distance lines. For the echo canceler, the level of the transmission signal from FAX 1 is compared with the level of the reception signal from FAX2. When the transmission signal is larger, S1 is closed while S2 is opened when it is smaller. In other words, for transmission from FAX1, S1 is closed and S2 is open, so that the echo does not return to FAX1.

(Causes and Countermeasures)

No.	Countermeasure Side	Echo Communication Problem Example	Countermeasure	Service Code
1	Sending side	Some time is needed to compare the level of the receiving and sending signals for the echo canceler. The header of the training signal lacks due to a switching delay to close S1.	Add a dummy signal to the beginning of the training signal.	Service code (521) (International mod select) This countermeasu becomes the defau value.
2	Receiving side	The echo canceler function stops according to a CED signal frequency of 2100Hz (S1 and S2 are both ON), a DIS signal is returned as an echo, and a DCS signal from the sending side overlaps the DIS echo. Then the receiving side FAX cannot retrieve the DCS signal. (Refer to Fig. a)	Change to a 1100Hz CED signal frequency. (Refer to Fig. b)	Service code (520) (CED frequency select)
	Receiving side		Change the regular rime of 75 msec between the CED signal and DIS signal to 500 msec. This will give at least 250 msec to recover the echo canceler operation. (Refer to Fig. c)	Service code (593) (Time between CE and 300 bps)
	Sending side		The sending side FAX sends a DCS signal not after receiving the 1st DIS signal but after receiving the 2nd DIS signal. (Refer to Fig. d)	Service code (594) (Overseas DIS detection select)

No.	Countermeasure Side	Echo Communication Problem Example	Countermeasure	Service Code
3	Sending side	Communication failure occurs in a long distance communication on the telephone line without an echo canceler. or	Decrease the transmission level from -10 dBm to -15 dBm and the echo level will decrease.	Service code (596) (Transmit level se
4	Sending side Receiving side		Decrease the receiving sensitivity from -13 dBm to about -32 dBm so an echo signal will not received.	Service code (598) (Receiving sensitivi
5	Sending side Receiving side	There are some cases (e.g. Mobil comms.) which cause the collision of TX / RX signals due to the delay / echo and noise of the network / terminal. (Refer to Fig. e)	Set additional Pause time (Service mode: code No. 774) in between the original and its repeated signals, to prevent the collision of the signals at both end.	Service code (774) (T4 timer)

Fig. a (Overlapping the Echo of the DIS signal and DCS signal)

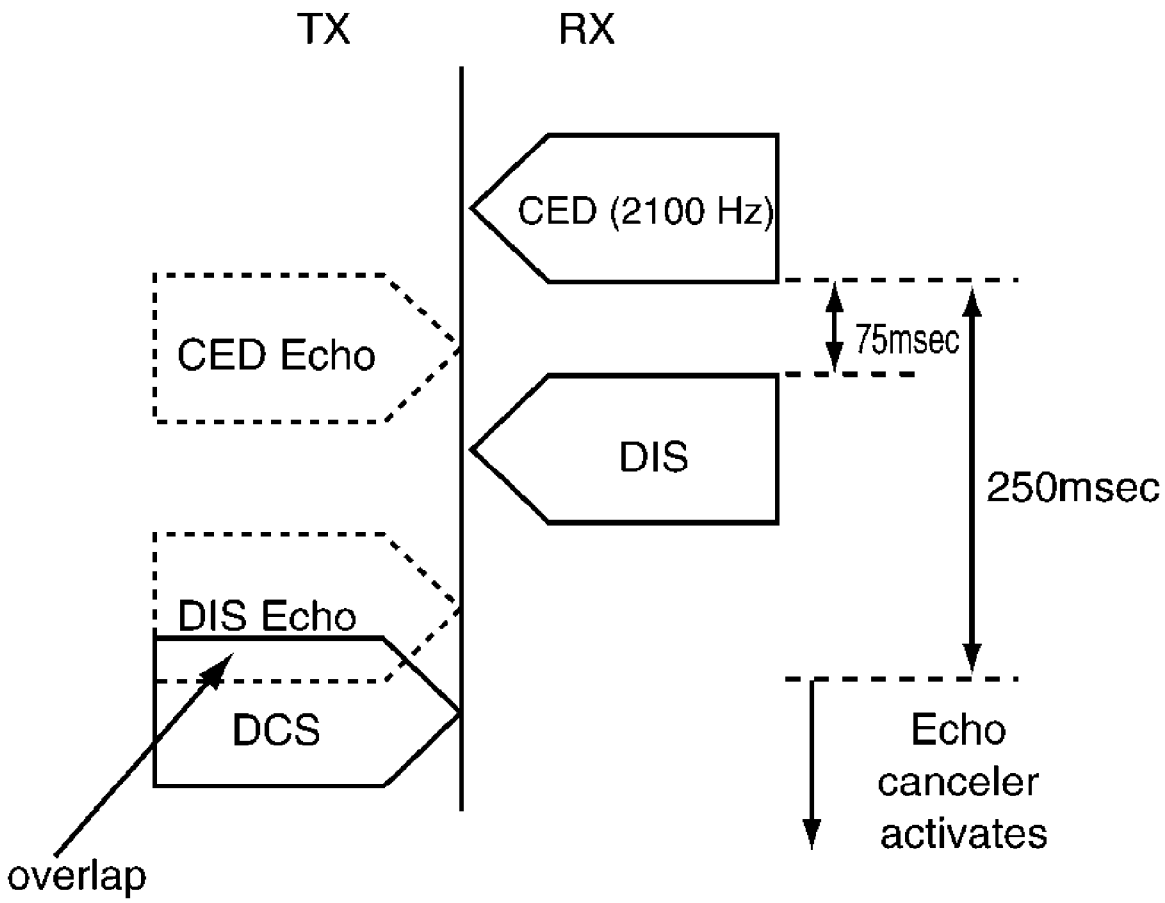


Fig. b (Countermeasure by Changing the CED Frequency)

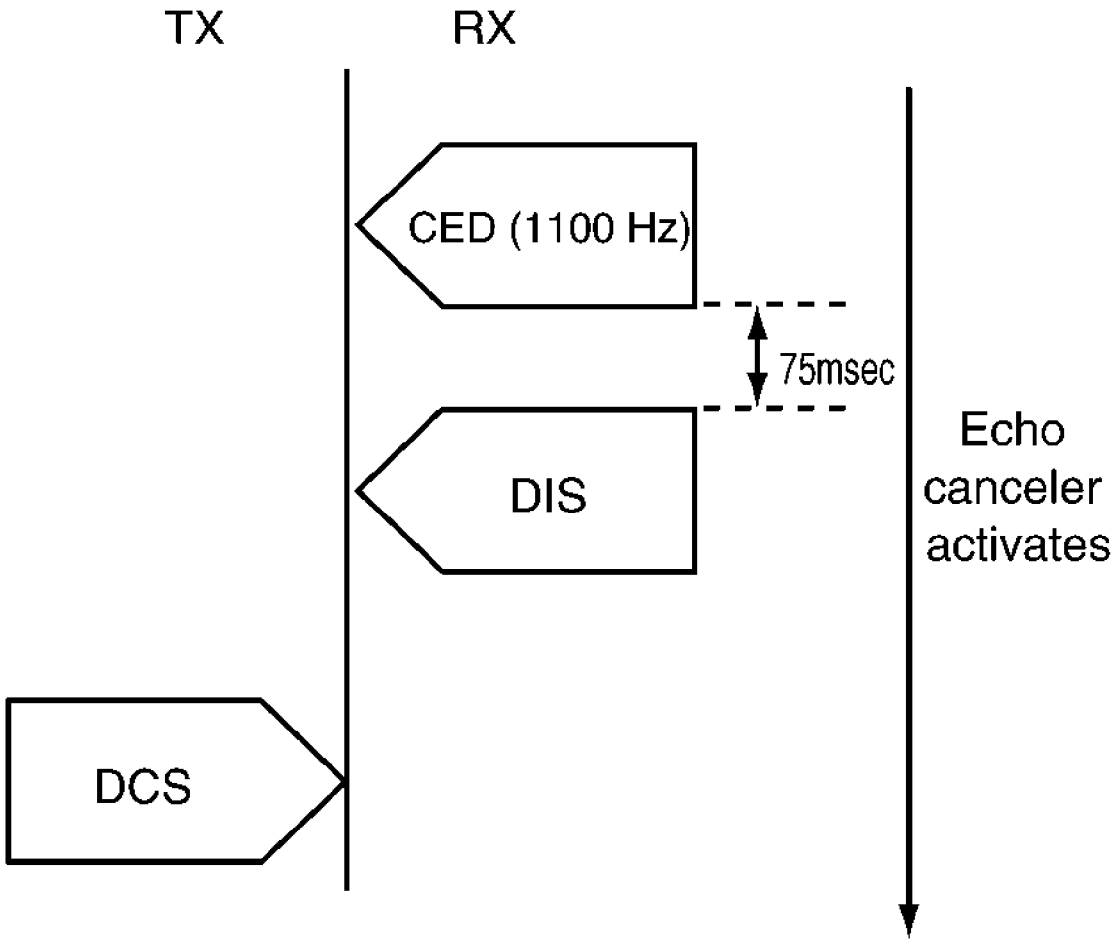


Fig. c (Countermeasure by Changing the Interval Between CED and DIS)

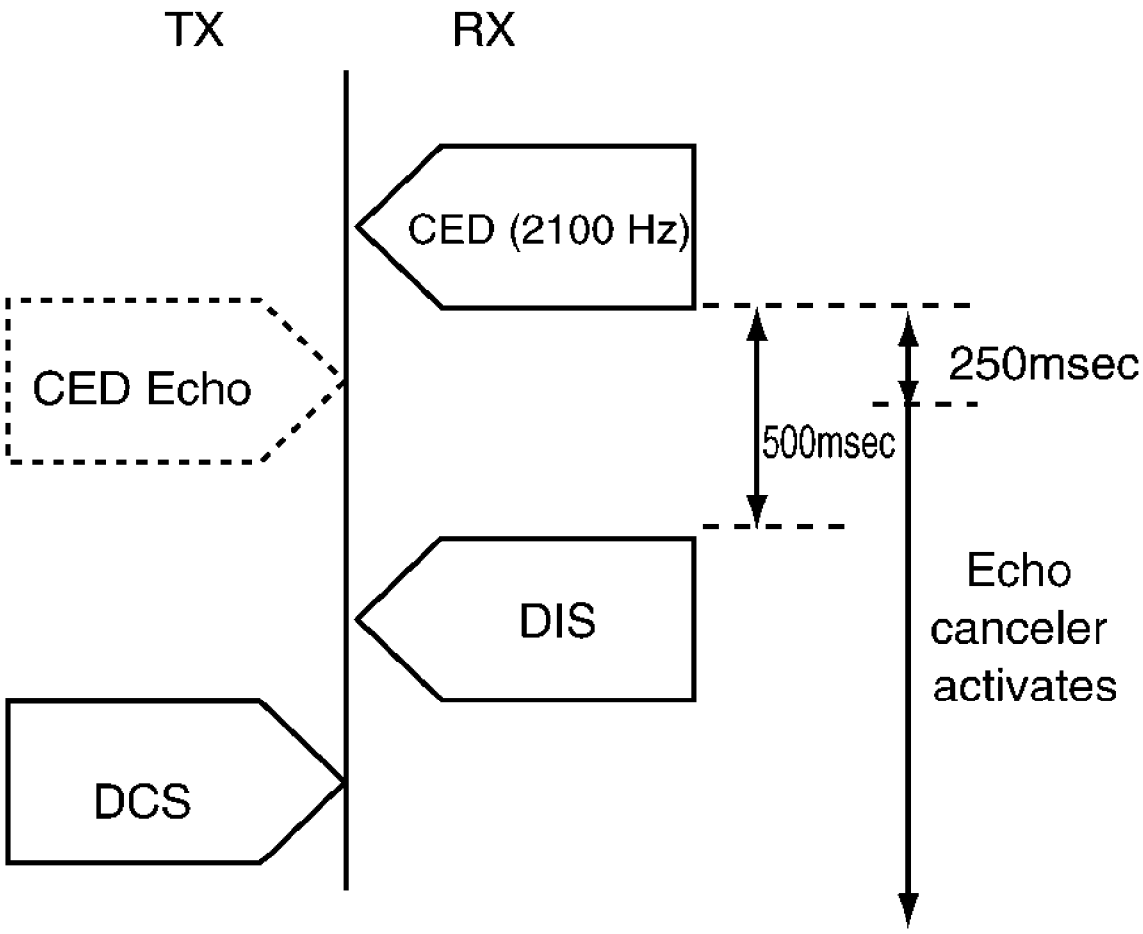
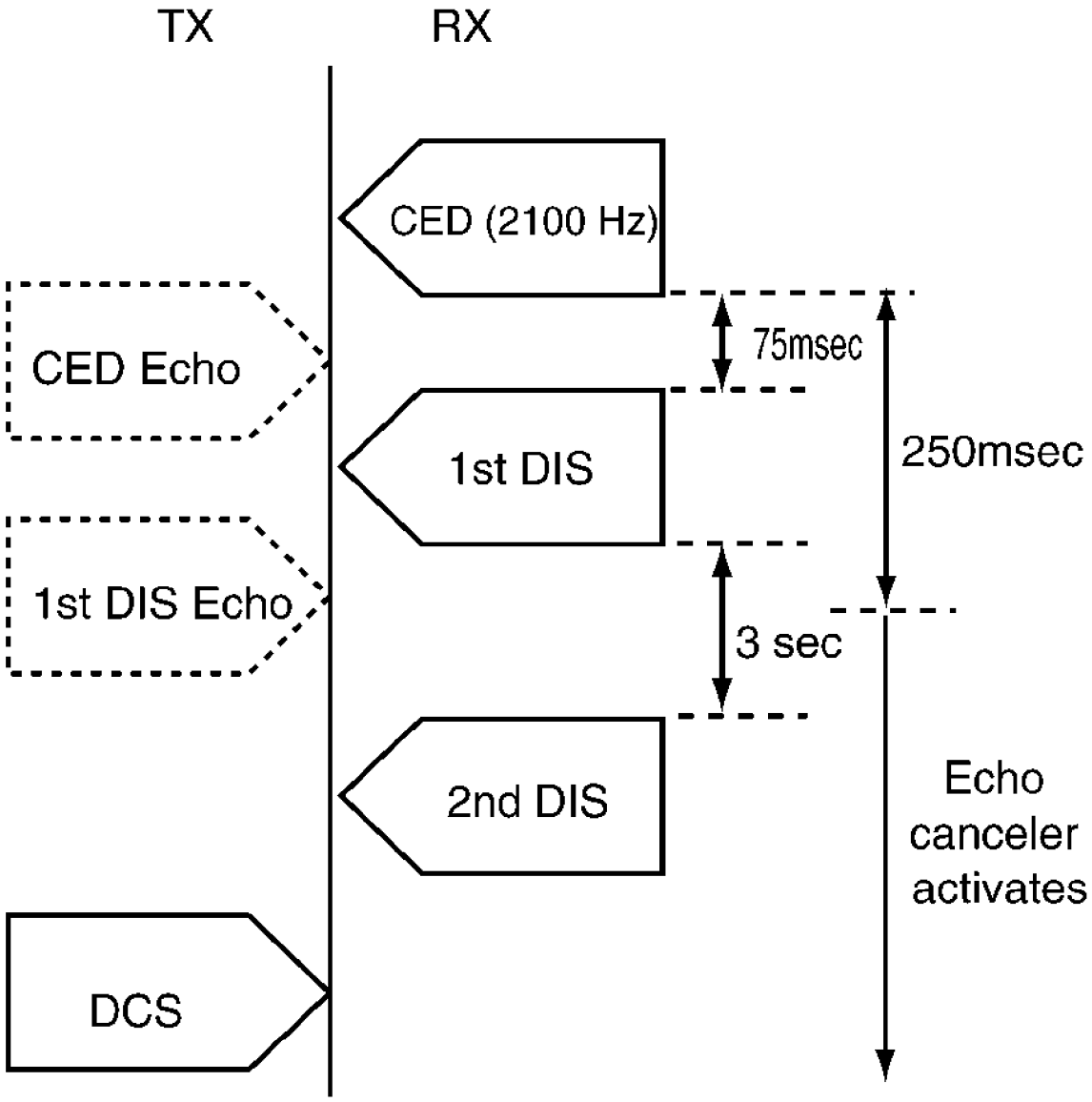
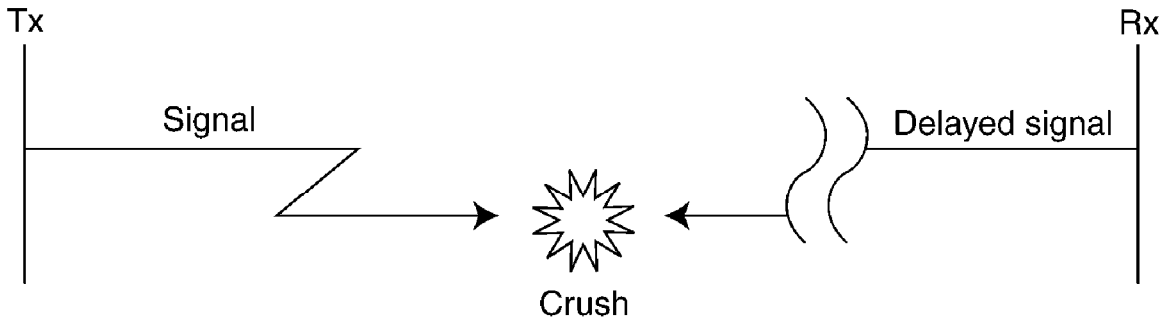


Fig. d (C3ountemeasure by Ignoring the 1st DIS)



<TX side signal>	<RX side signal>	<Countermeasure>
2nd / 3rd DCS / Training	& delayed CFR / FTT	at TX side
2nd / 3rd EOP / EOM / MPS	& delayed MCF / PIP / PIN / RTP / RTN	at TX side
delayed DCS	& 2nd / 3rd / --- DIS	at RX side

(Fig. e)



6.7.5.1.6. The unit can copy, but the transmission and reception image are incorrect

(Long distance or international communication operation)
This symptom highly depends on the transmission and reception capability of the other FAX unit and the line conditions.
The countermeasures for this unit are shown below.

Transmission Operation:
Set the transmitting speed to 4800BPS (service mode: code No. 717) or select the overseas mode.

Reception Operation:
If 80% or more of the reception is incorrect, set the receiving speed to 4800BPS. (Service mode: code No. 718)

- **Refer to SERVICE FUNCTION TABLE( ).**

6.7.5.1.7. How to record fax signal by using PC

Recording FAX signal is one of the useful analysis measures to solve communication problems.
The way of recording easily by using PC is shown as follows.

1. Equipment

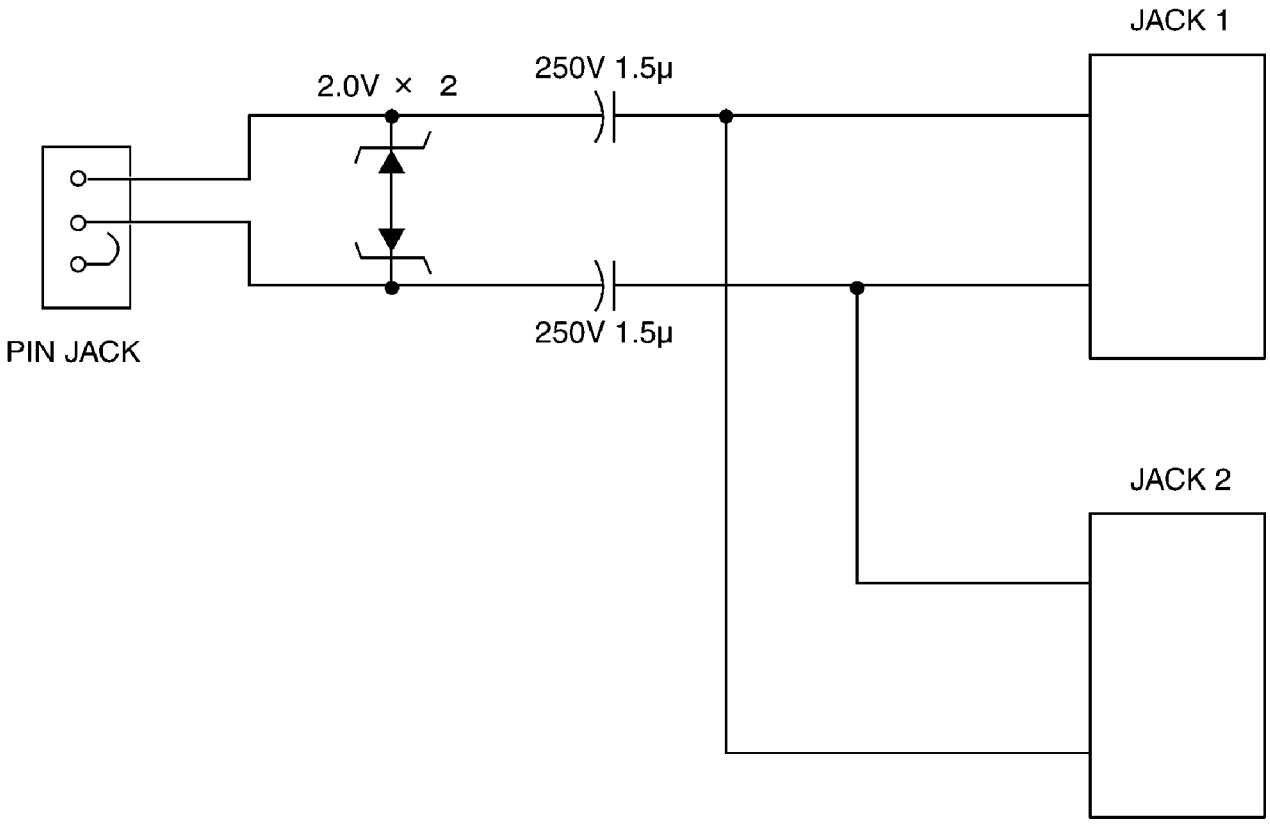
- **1 jig**

- **1 PC (with LINE IN)**
- **1 audio cord (mini jack supported)**
- **2 tel cords**

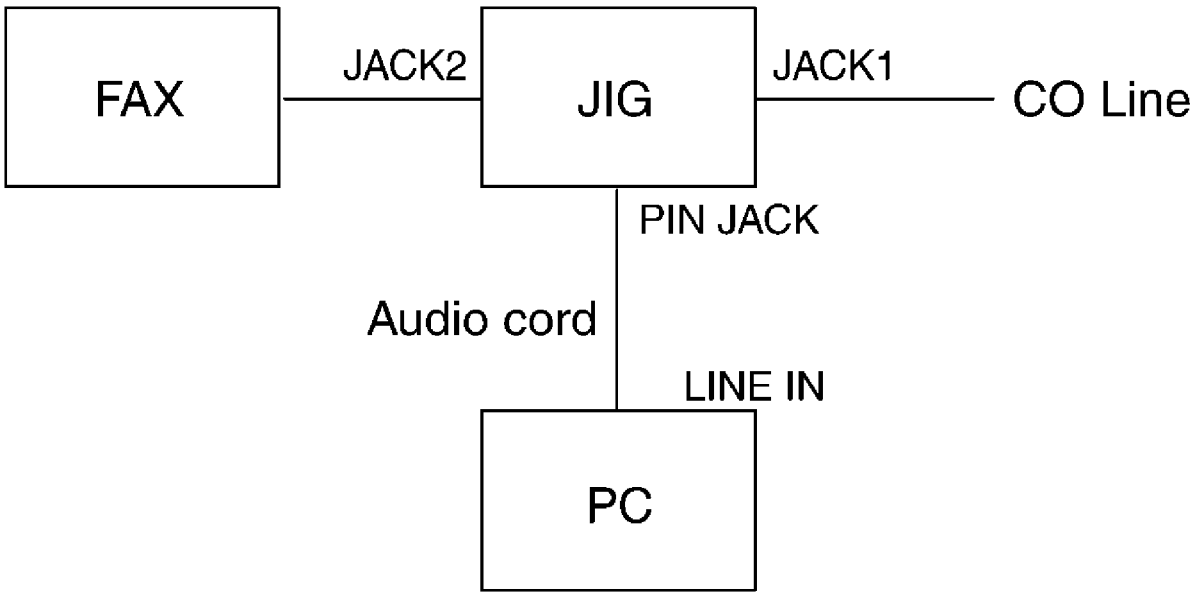
Parts No.	Parts Name & Description	Qt'y
PQJJ1T004Z	JACK1, JACK2	2
PQJJ1D010Z	PIN JACK	1
ECQE2155KF or ECQE2E155KC	CAPACITOR	2
MA4020	DIODE	2

2. Setting up

FAX SIGNAL RECORDING JIG



3. Connecting PC and JIG



4. PC setting and recording

1. Set LINE IN to be valid in the volume control setting.
Refer to the PC instruction book.

2. Start up the PC software "SOUND RECORDER". (This software is bundled to Windows OS, which can create WAV file.)
Set the audio format "PCM 22.050kHz, 8bit, mono".

3. Click the record button and start recording after acquisition the signal.

Note:

- **Not to be wind wave patterns on the wave monitor.**
- **Please compress the recording data when you send attaching to E-Mail because the data size will be so heavy.**
- **Any software which can create WAV files is available.**

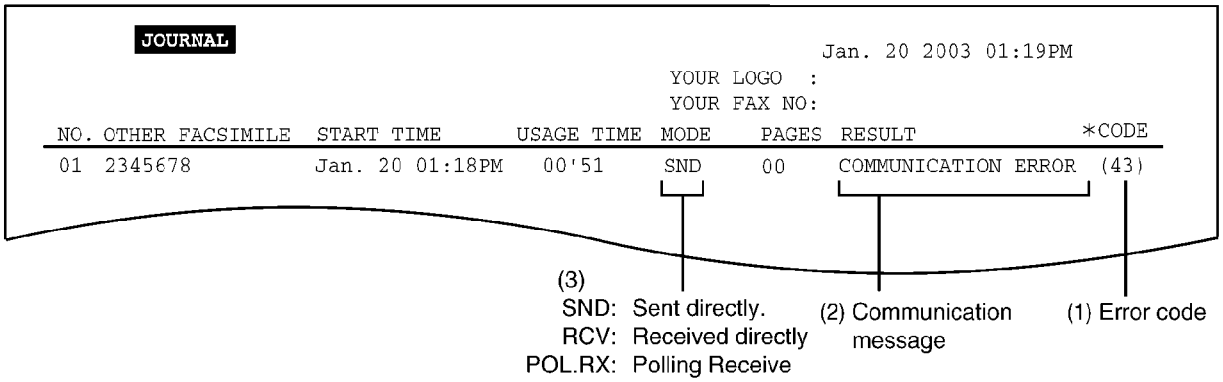
6.7.5.1.8. How to output the journal report

1. Press [MENU] repeatedly to display “PRINT REPORT”.

2. Press [◀] or [▶] until the “JOURNAL REPORT” is displayed.

3. Press [SET].

4. The report is printed out.


JOURNAL
Jan. 20 2003 01:19PM
YOUR LOGO :
YOUR FAX NO:
NO. OTHER FACSIMILE START TIME USAGE TIME MODE PAGES RESULT *CODE
01 2345678 Jan. 20 01:18PM 00'51 SND 00 COMMUNICATION ERROR (43)
(3)
SND: Sent directly.
RCV: Received directly
POL.RX: Polling Receive
(2) Communication message
(1) Error code

Error code table:

(1) CODE	(2) RESULT	(3) MODE	SYMPTOM	Cour *
	PRESSED THE STOP KEY	SND & RCV	Communication was interrupted by the STOP button.	
	DOCUMENT JAMMED	SND	The document paper is jammed.	
	NO DOCUMENT	SND	No document paper.	
	OTHER FAX NOT RESPONDING	SND	Transmission is finished when the T1 TIMER expires.	1
28	COMMUNICATION ERROR	SND & RCV	----------	
41	COMMUNICATION ERROR	SND	DCN is received after DCS transmission.	2
42	COMMUNICATION ERROR	SND	FTT is received after transmission of a 2400BPS training signal.	3
43	COMMUNICATION ERROR	SND	No response after post message is transmitted three times.	4
44	COMMUNICATION ERROR	SND	RTN and PIN are received.	5
46	COMMUNICATION ERROR	RCV	No response after FTT is transmitted.	6
48	COMMUNICATION ERROR	RCV	No post message.	7
49	COMMUNICATION ERROR	RCV	RTN is transmitted.	8
50	COMMUNICATION ERROR	RCV	PIN is transmitted (to PRI-Q).	8
51	COMMUNICATION ERROR	RCV	PIN is transmitted.	8

(1) CODE	(2) RESULT	(3) MODE	SYMPTOM	Cour *
	OTHER FAX NOT RESPONDING	RCV	Reception is finished when the T1 TIMER expires.	9
54	ERROR-NOT YOUR UNIT	RCV	DCN is received after DIS transmission.	11
58	COMMUNICATION ERROR	RCV	DCN is received after FTT transmission.	13
59	ERROR-NOT YOUR UNIT	SND	DCN responds to the post message.	14
64	COMMUNICATION ERROR	POL.RX	Polling is not possible.	15
65	COMMUNICATION ERROR	SND	DCN is received before DIS reception.	2
65	COMMUNICATION ERROR	RCV	Reception is not EOP, EOM PIP, PIN, RTP or RTN.	2
68	COMMUNICATION ERROR	RCV	No response at the other party after MCF or CFR is transmitted.	13
70	ERROR-NOT YOUR UNIT	RCV	DCN is received after CFR transmission.	13
72	COMMUNICATION ERROR	RCV	Carrier is cut when the image signal is received.	16
	MEMORY FULL	RCV	The document was not received due to memory full.	
	CANCELED	SND	The multi-station transmission was rejected by the user.	
80	COMMUNICATION ERROR	SND	The error: the transmitted document was longer than the receivable document length of the receiver.	
FF	COMMUNICATION ERROR	SND & RCV	Modem error. For the DCN, DCN, etc. abbreviations, refer to MODEM SECTION ( ).	12

SND=TRANSMISSION RCV=RECEPTION

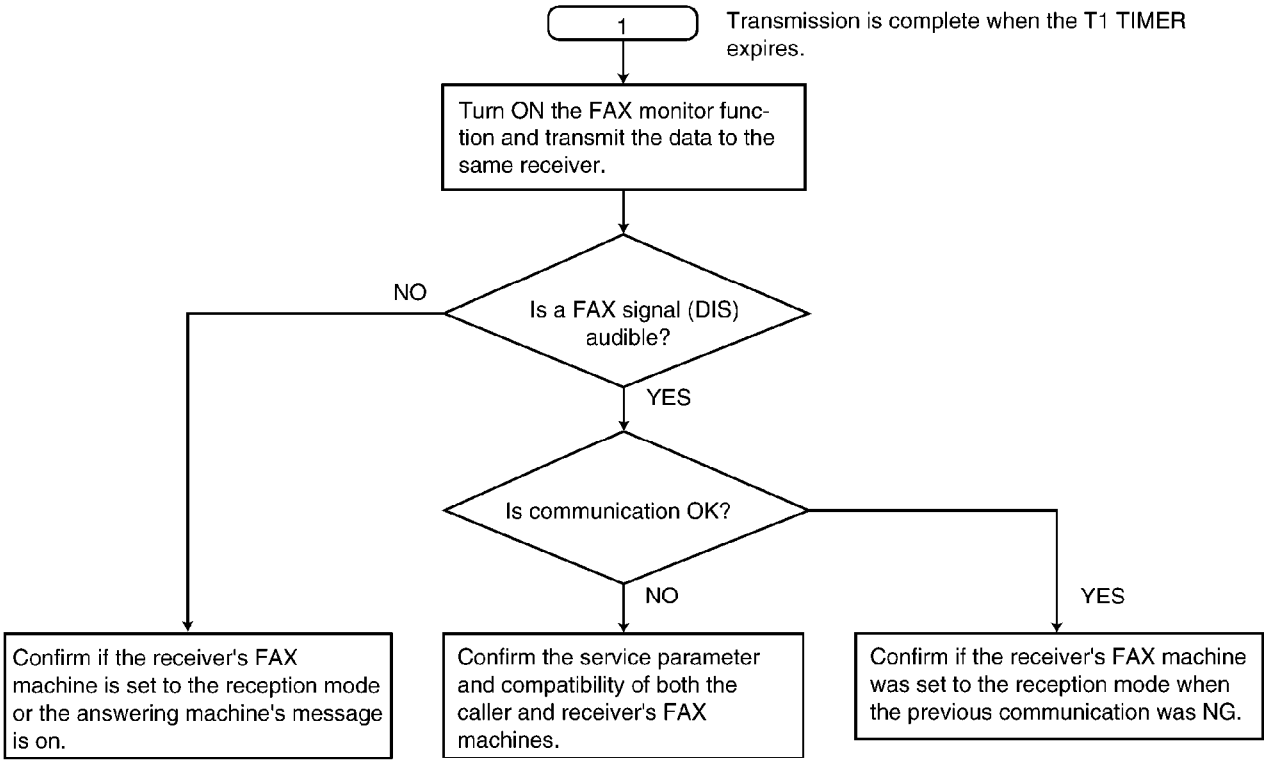
Most fax communication problems can be resolved by the following steps.

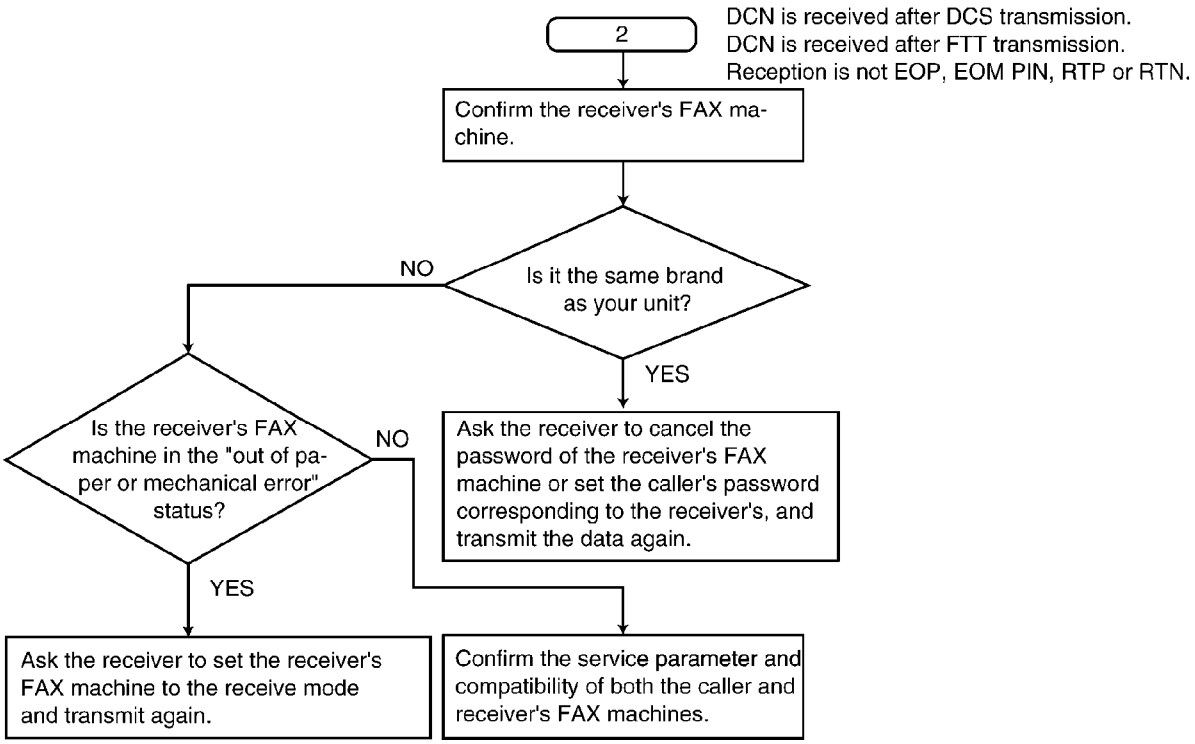
1. **Change the transmit level. (Service code: 596, refer to SERVICE FUNCTION TABLE( ).)**
2. **Change the TX speed/RX speed. (Service code: 717/718, refer to SERVICE FUNCTION TABLE ( ).)**

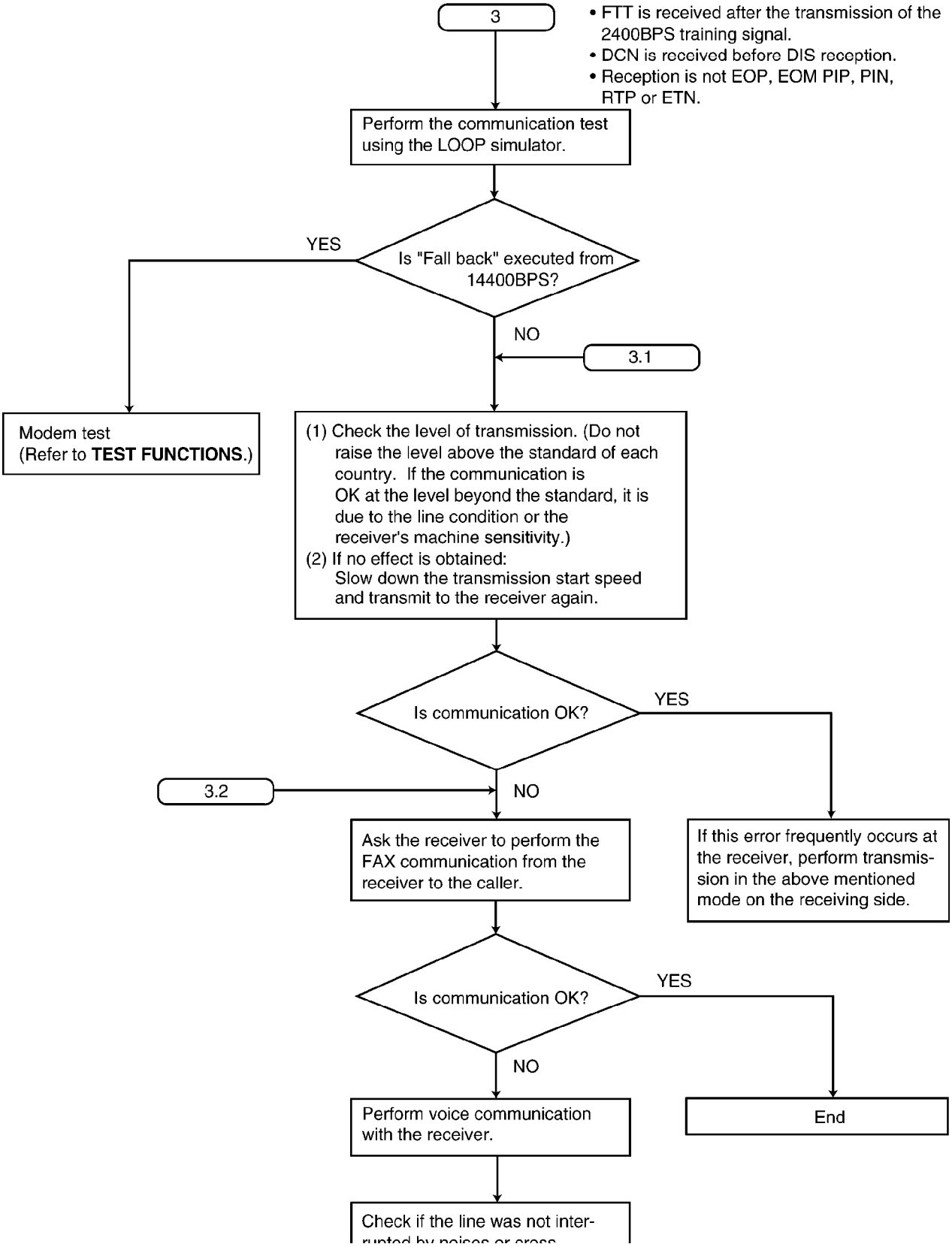
Note*:

If the problem remains, see the following "Countermeasure" flow chart.

Countermeasure

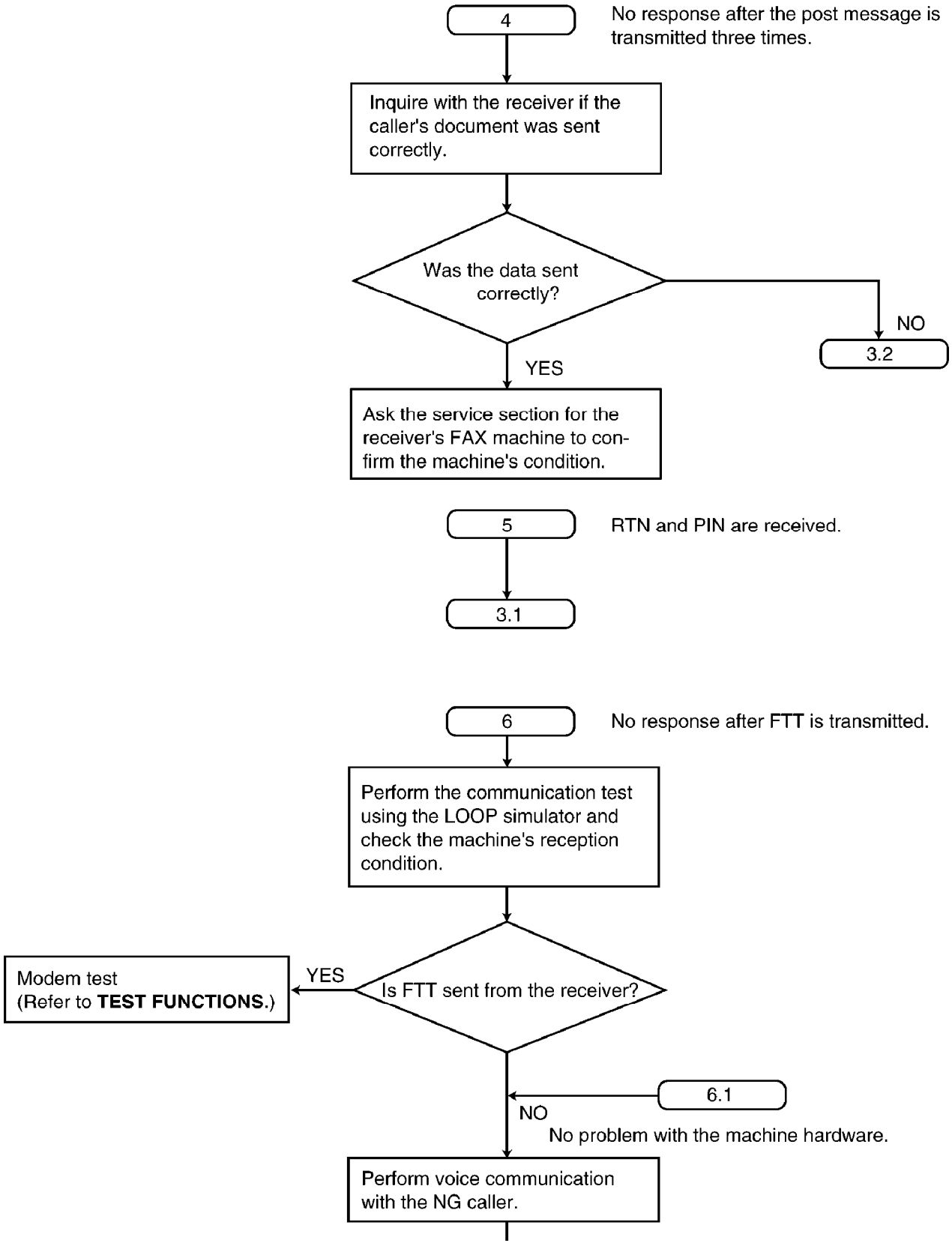

1
Transmission is complete when the T1 TIMER expires.
Turn ON the FAX monitor function and transmit the data to the same receiver.
Is a FAX signal (DIS) audible?
NO
YES
Is communication OK?
NO
YES
Confirm if the receiver's FAX machine is set to the reception mode or the answering machine's message is on.
Confirm the service parameter and compatibility of both the caller and receiver's FAX machines.
Confirm if the receiver's FAX machine was set to the reception mode when the previous communication was NG.

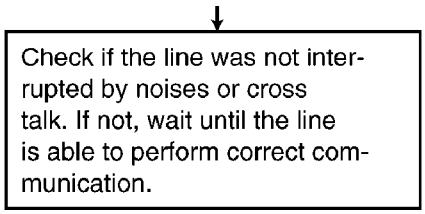

2
DCN is received after DCS transmission.
DCN is received after FTT transmission.
Reception is not EOP, EOM PIN, RTP or RTN.
Confirm the receiver's FAX machine.
Is it the same brand as your unit?
NO
YES
Is the receiver's FAX machine in the "out of paper or mechanical error" status?
NO
YES
Ask the receiver to cancel the password of the receiver's FAX machine or set the caller's password corresponding to the receiver's, and transmit the data again.
Ask the receiver to set the receiver's FAX machine to the receive mode and transmit again.
Confirm the service parameter and compatibility of both the caller and receiver's FAX machines.


3
• FTT is received after the transmission of the 2400BPS training signal.
• DCN is received before DIS reception.
• Reception is not EOP, EOM PIP, PIN, RTP or ETN.
Perform the communication test using the LOOP simulator.
Is "Fall back" executed from 14400BPS?
YES
NO
3.1
Modem test
(Refer to **TEST FUNCTIONS**.)
(1) Check the level of transmission. (Do not raise the level above the standard of each country. If the communication is OK at the level beyond the standard, it is due to the line condition or the receiver's machine sensitivity.)
(2) If no effect is obtained:
Slow down the transmission start speed and transmit to the receiver again.
Is communication OK?
YES
3.2
NO
Ask the receiver to perform the FAX communication from the receiver to the caller.
If this error frequently occurs at the receiver, perform transmission in the above mentioned mode on the receiving side.
Is communication OK?
YES
NO
Perform voice communication with the receiver.
End
Check if the line was not inter-

rupted by noises or cross talk. If not, wait until the line is able to perform correct communication.

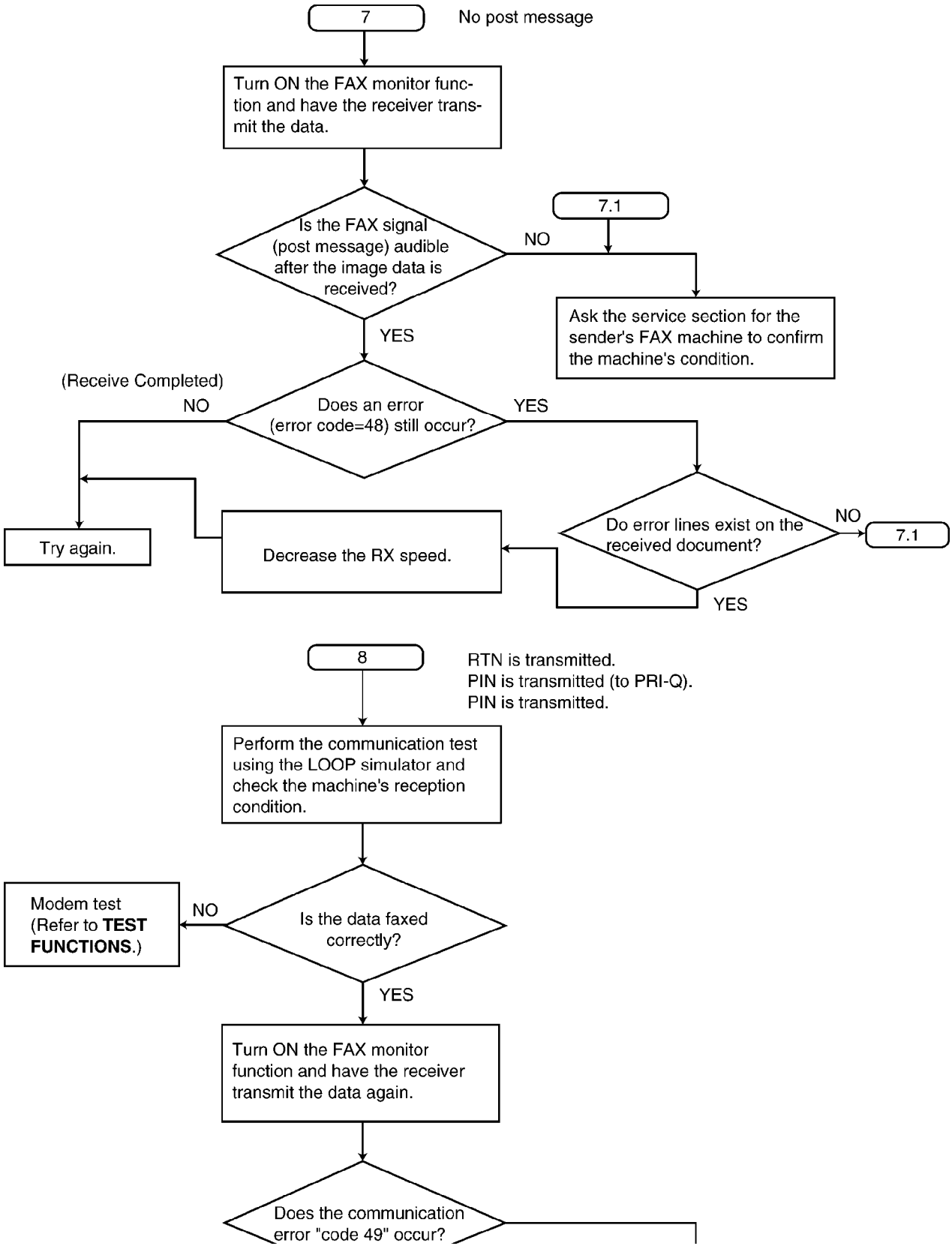
CROSS REFERENCE:
TEST FUNCTIONS( )

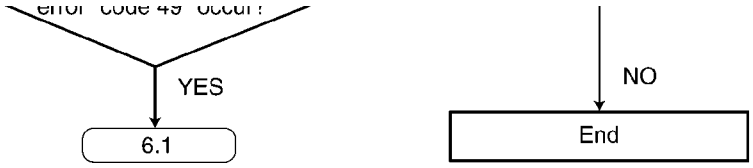

4
No response after the post message is transmitted three times.
Inquire with the receiver if the caller's document was sent correctly.
Was the data sent correctly?
NO
3.2
YES
Ask the service section for the receiver's FAX machine to confirm the machine's condition.
5
RTN and PIN are received.
3.1
6
No response after FTT is transmitted.
Perform the communication test using the LOOP simulator and check the machine's reception condition.
Modem test
(Refer to **TEST FUNCTIONS**.)
YES
Is FTT sent from the receiver?
6.1
NO
No problem with the machine hardware.
Perform voice communication with the NG caller.


Check if the line was not interrupted by noises or cross talk. If not, wait until the line is able to perform correct communication.

CROSS REFERENCE:

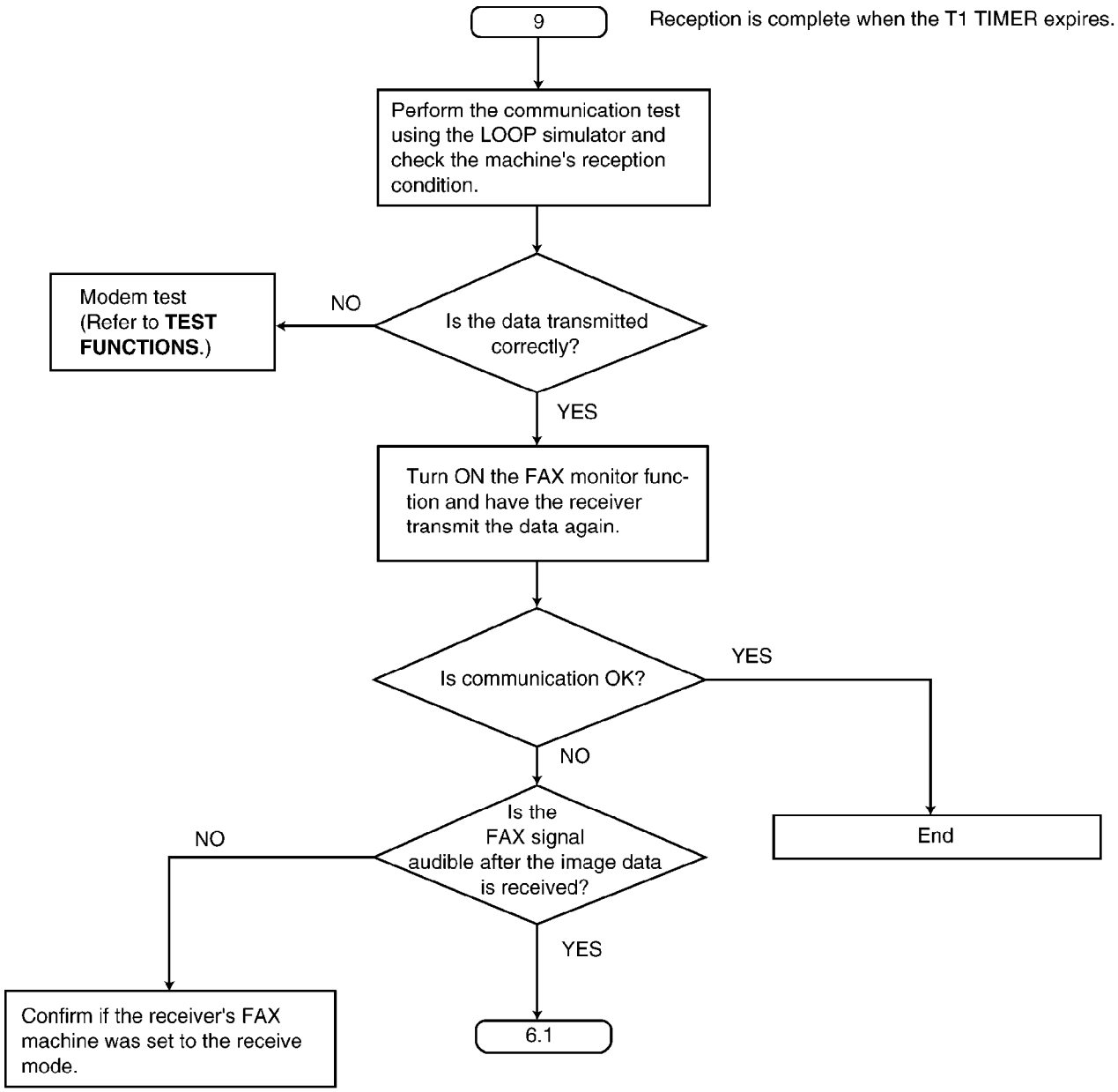
TEST FUNCTIONS( )


7
No post message
Turn ON the FAX monitor function and have the receiver transmit the data.
Is the FAX signal (post message) audible after the image data is received?
NO
7.1
Ask the service section for the sender's FAX machine to confirm the machine's condition.
YES
(Receive Completed)
NO
Does an error (error code=48) still occur?
YES
Try again.
Decrease the RX speed.
Do error lines exist on the received document?
NO
7.1
YES
8
RTN is transmitted.
PIN is transmitted (to PRI-Q).
PIN is transmitted.
Perform the communication test using the LOOP simulator and check the machine's reception condition.
Modem test (Refer to **TEST FUNCTIONS**.)
NO
Is the data faxed correctly?
YES
Turn ON the FAX monitor function and have the receiver transmit the data again.
Does the communication error "code 49" occur?

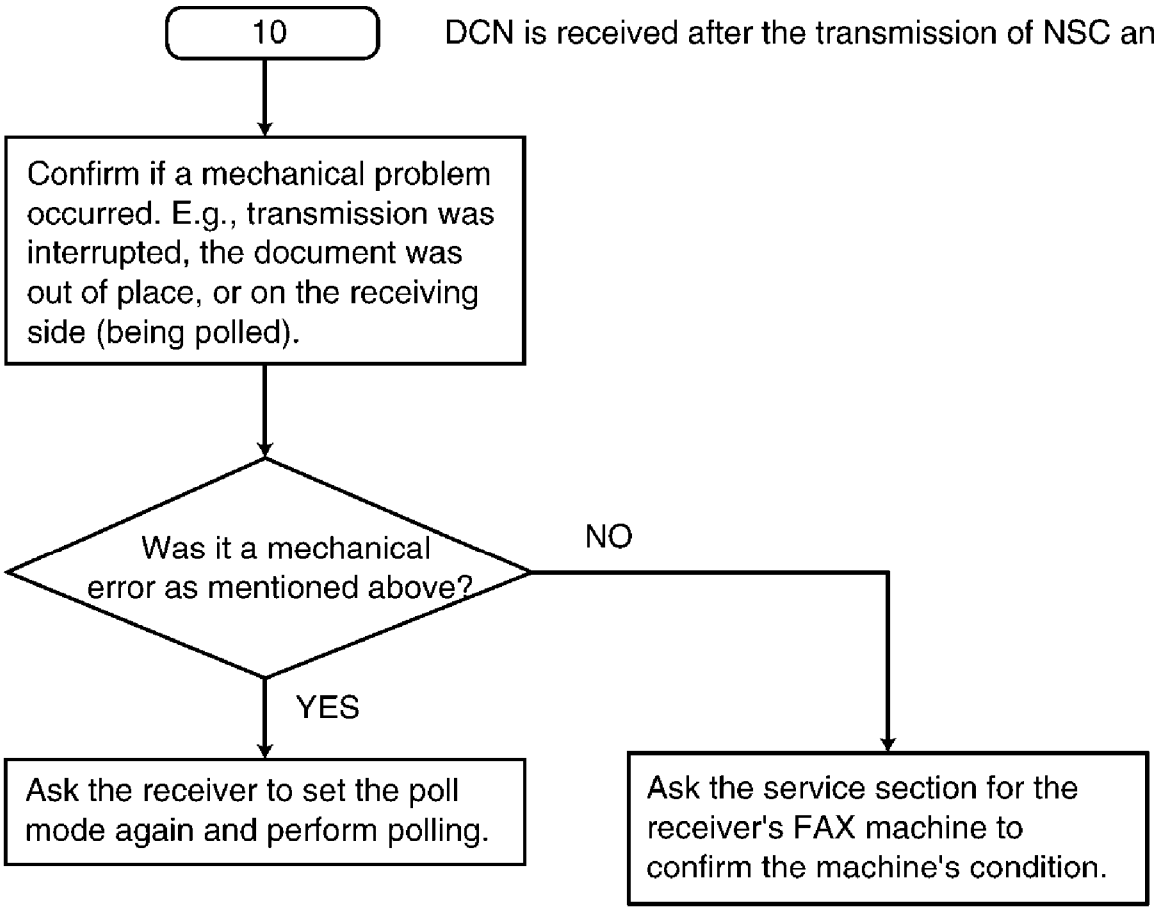


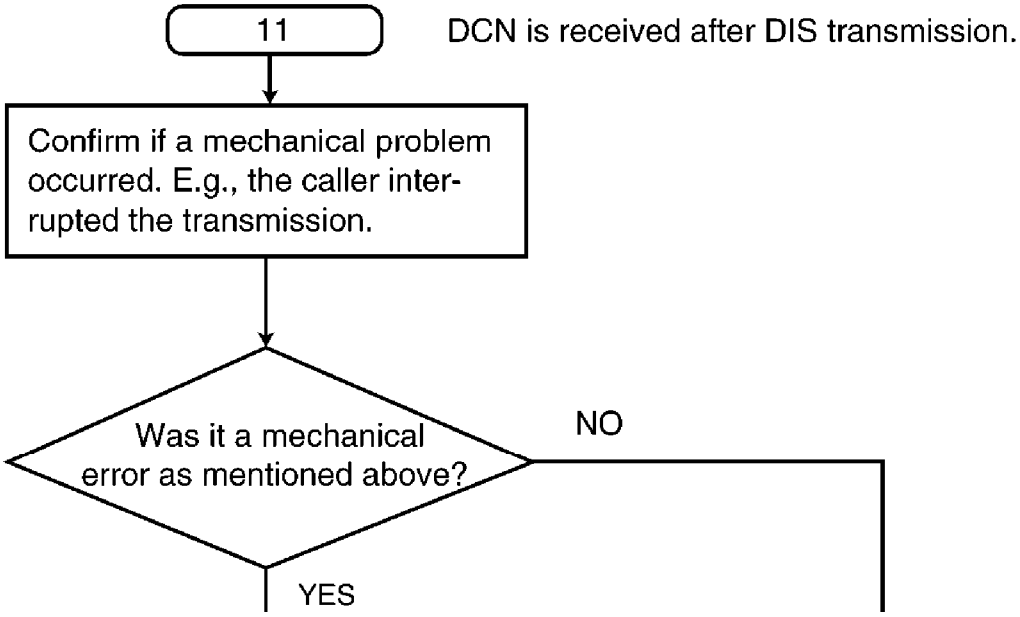
CROSS REFERENCE:

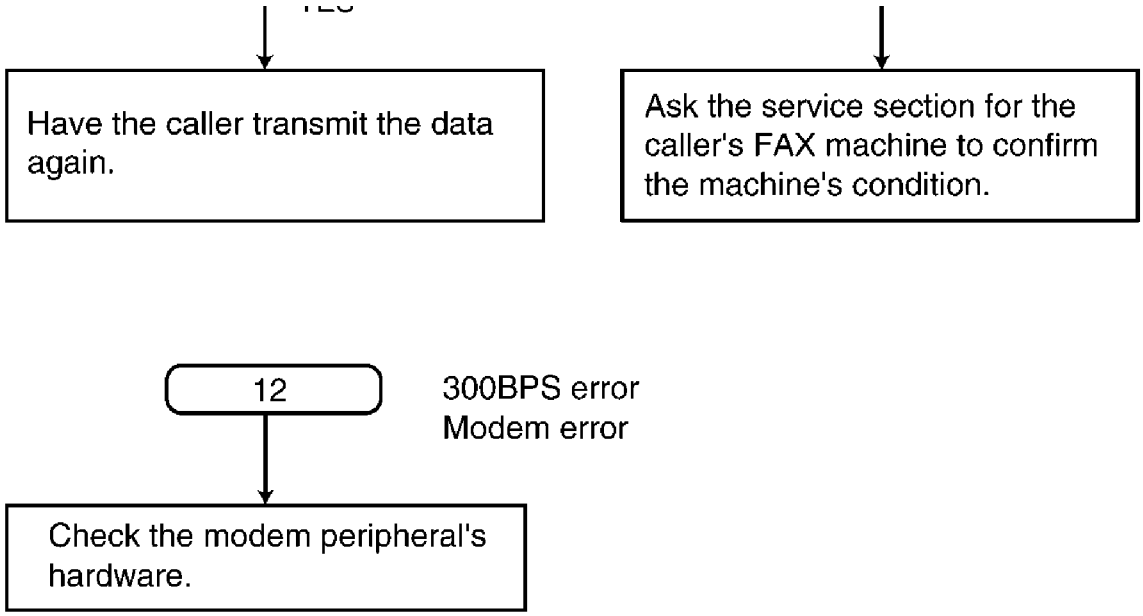
TEST FUNCTIONS( )

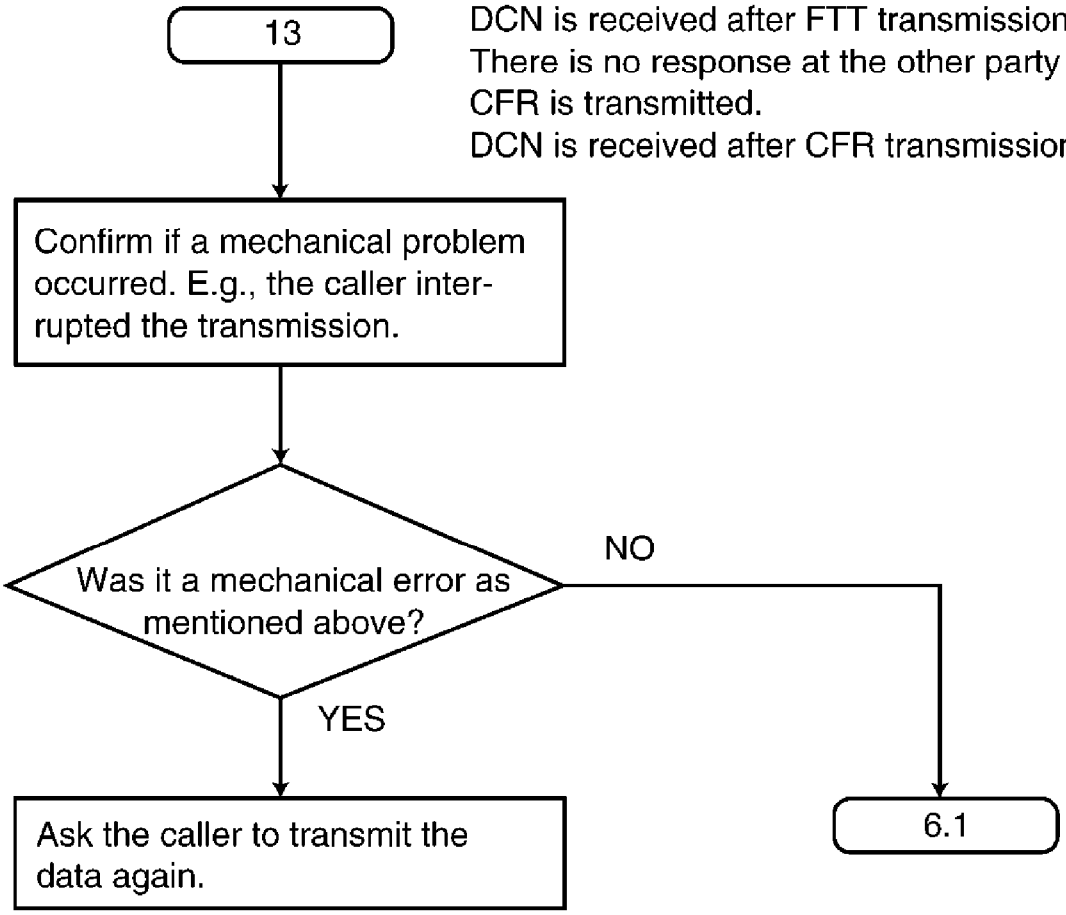

9
Reception is complete when the T1 TIMER expires.
Perform the communication test using the LOOP simulator and check the machine's reception condition.
Is the data transmitted correctly?
NO
Modem test (Refer to **TEST FUNCTIONS**.)
YES
Turn ON the FAX monitor function and have the receiver transmit the data again.
Is communication OK?
YES
End
NO
Is the FAX signal audible after the image data is received?
NO
YES
Confirm if the receiver's FAX machine was set to the receive mode.
6.1

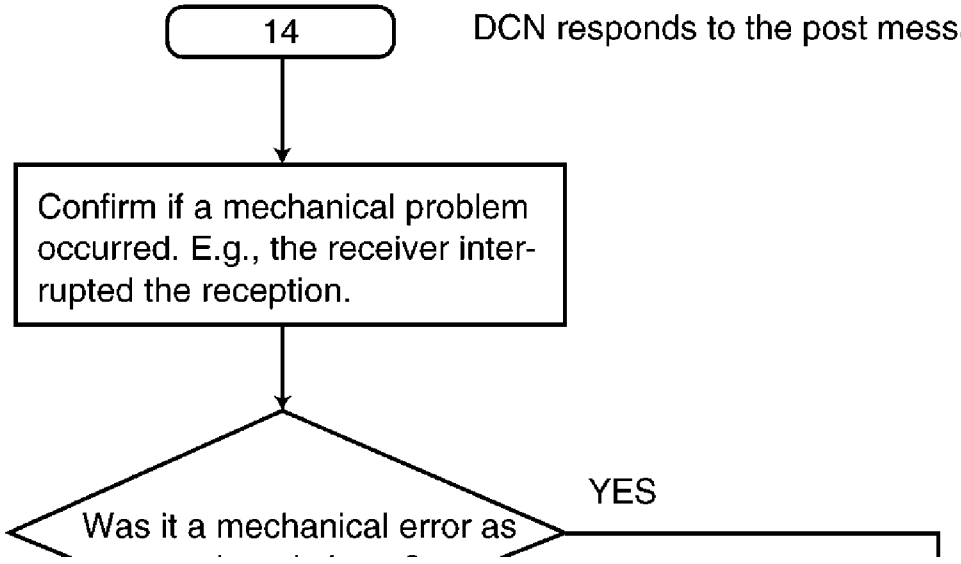
CROSS REFERENCE:
TEST FUNCTIONS(
)

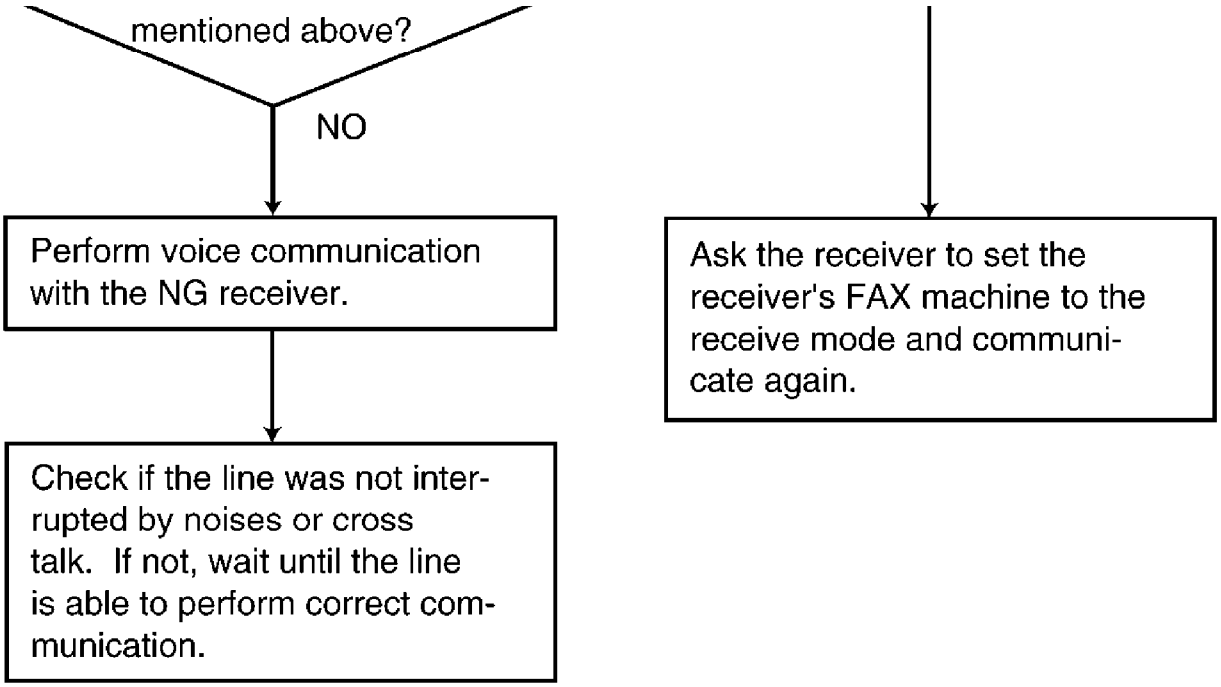

10
DCN is received after the transmission of NSC and DTC.
Confirm if a mechanical problem occurred. E.g., transmission was interrupted, the document was out of place, or on the receiving side (being polled).
Was it a mechanical error as mentioned above?
NO
YES
Ask the receiver to set the poll mode again and perform polling.
Ask the service section for the receiver's FAX machine to confirm the machine's condition.

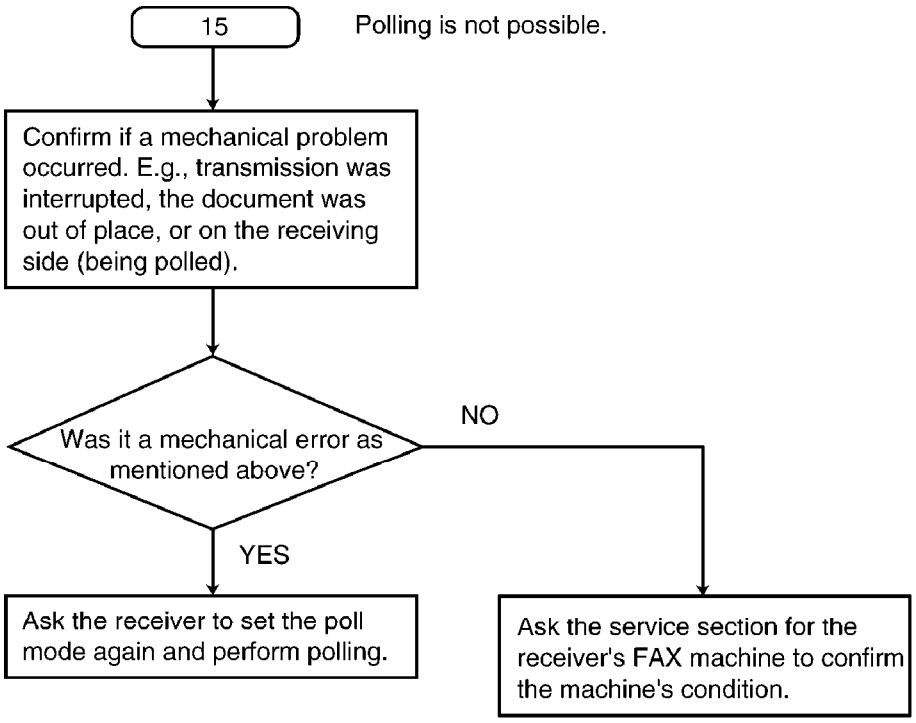

11
DCN is received after DIS transmission.
Confirm if a mechanical problem occurred. E.g., the caller interrupted the transmission.
Was it a mechanical error as mentioned above?
NO
YES

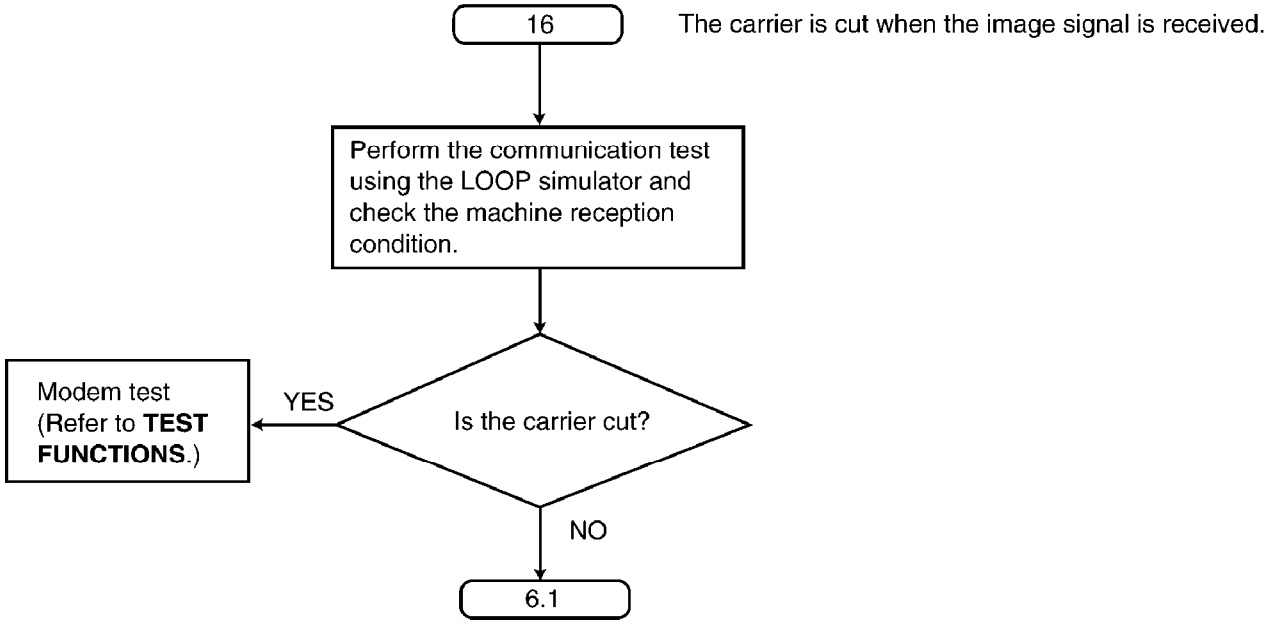

Have the caller transmit the data again.
Ask the service section for the caller's FAX machine to confirm the machine's condition.
12
300BPS error
Modem error
Check the modem peripheral's hardware.


13
DCN is received after FTT transmission.
There is no response at the other party after MCF or CFR is transmitted.
DCN is received after CFR transmission.
Confirm if a mechanical problem occurred. E.g., the caller interrupted the transmission.
Was it a mechanical error as mentioned above?
NO
YES
Ask the caller to transmit the data again.
6.1


14
DCN responds to the post message.
Confirm if a mechanical problem occurred. E.g., the receiver interrupted the reception.
Was it a mechanical error as
YES


mentioned above?
NO
Perform voice communication with the NG receiver.
Check if the line was not interrupted by noises or cross talk. If not, wait until the line is able to perform correct communication.
Ask the receiver to set the receiver's FAX machine to the receive mode and communicate again.


15
Polling is not possible.
Confirm if a mechanical problem occurred. E.g., transmission was interrupted, the document was out of place, or on the receiving side (being polled).
Was it a mechanical error as mentioned above?
NO
YES
Ask the receiver to set the poll mode again and perform polling.
Ask the service section for the receiver's FAX machine to confirm the machine's condition.

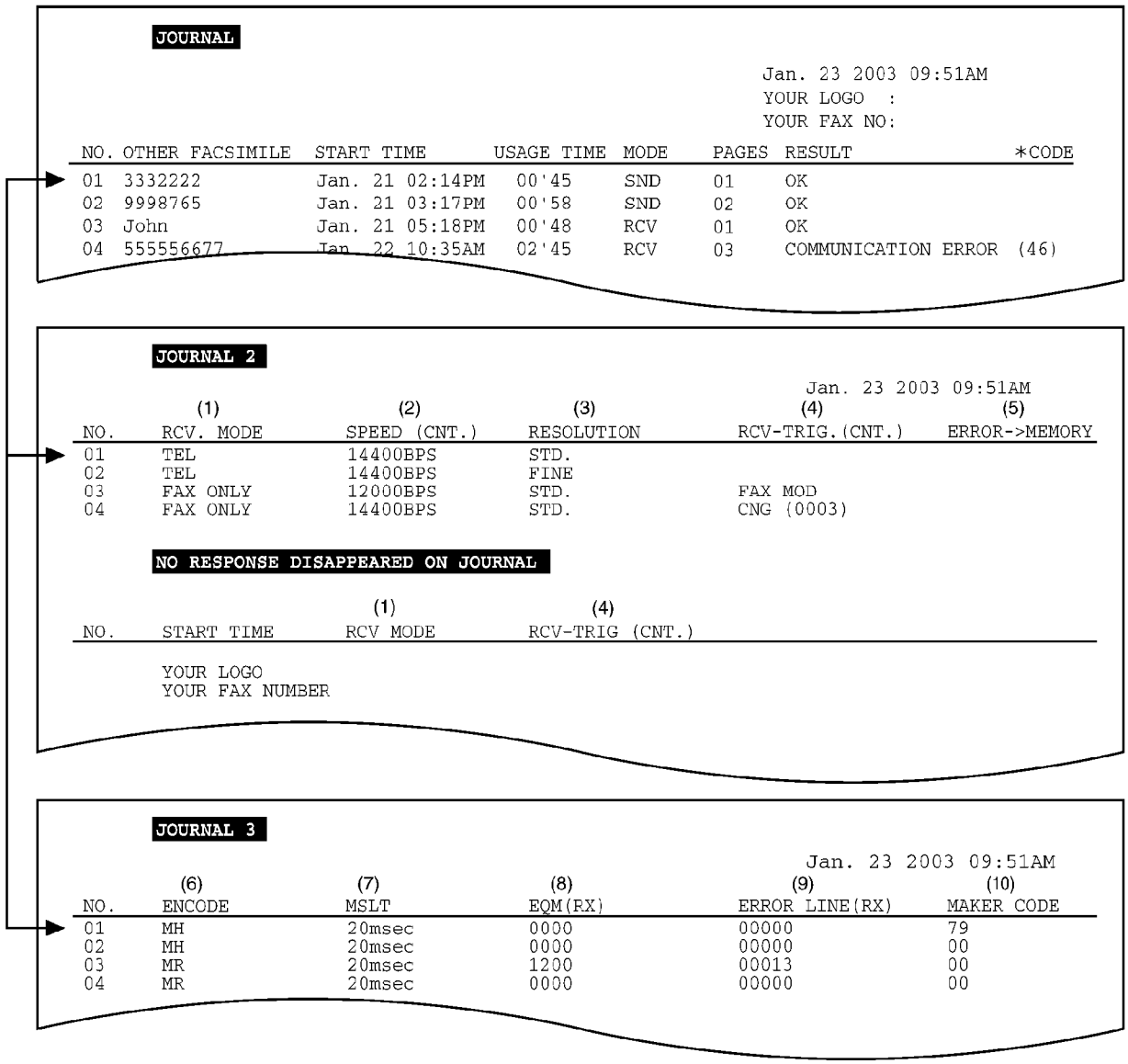

16
The carrier is cut when the image signal is received.
Perform the communication test using the LOOP simulator and check the machine reception condition.
Modem test (Refer to **TEST FUNCTIONS**.)
YES
Is the carrier cut?
NO
6.1

CROSS REFERENCE:

TEST FUNCTIONS(
)

6.7.5.2. Special service journal reports

Journal 2 and Journal 3 shown below, which are special journals giving the additional detailed information about the latest 35 communications, can be printed by Service Code 881 or 882. Remote printing function for the journal reports (JOURNAL, JOURNAL 2 and JOURNAL 3) is also available for service technicians. (Refer to REMOTE PROGRAMMING(
).) The JOURNAL report only gives you basic information about a communication, but the other two journal reports provide different information on the same item (communication).



JOURNAL

Jan. 23 2003 09:51AM
YOUR LOGO :
YOUR FAX NO:

NO.	OTHER FACSIMILE	START TIME	USAGE TIME	MODE	PAGES	RESULT	*CODE
01	3332222	Jan. 21 02:14PM	00'45	SND	01	OK	
02	9998765	Jan. 21 03:17PM	00'58	SND	02	OK	
03	John	Jan. 21 05:18PM	00'48	RCV	01	OK	
04	555556677	Jan. 22 10:35AM	02'45	RCV	03	COMMUNICATION ERROR	(46)

JOURNAL 2

Jan. 23 2003 09:51AM

NO.	(1) RCV. MODE	(2) SPEED (CNT.)	(3) RESOLUTION	(4) RCV-TRIG.(CNT.)	(5) ERROR->MEMORY
01	TEL	14400BPS	STD.		
02	TEL	14400BPS	FINE		
03	FAX ONLY	12000BPS	STD.	FAX MOD	
04	FAX ONLY	14400BPS	STD.	CNG (0003)	

NO RESPONSE DISAPPEARED ON JOURNAL

NO.	START TIME	(1) RCV MODE	(4) RCV-TRIG (CNT.)

YOUR LOGO
YOUR FAX NUMBER

JOURNAL 3

Jan. 23 2003 09:51AM

NO.	(6) ENCODE	(7) MSLT	(8) EQM(RX)	(9) ERROR LINE(RX)	(10) MAKER CODE
01	MH	20msec	0000	00000	79
02	MH	20msec	0000	00000	00
03	MR	20msec	1200	00013	00
04	MR	20msec	0000	00000	00

HOW TO READ JOURNAL REPORTS:

Example:

1. Look at NO. 01 in the JOURNAL. If you want to know about the details about that item, see NO. 01 in the JOURNAL 2 and the JOURNAL 3. You can get the following information.

*** MODE: Fax transmission**
*** RCV. MODE: TEL**
*** TX SPEED: 14.4 kbps**
*** RESOLUTION: standard**
*** ENCODE: MH**

*** MAKER CODE: 79**

2. Look at NO. 04 in the JOURNAL 2. CNG (0003) indicates that the CNG signal has been received three times since the purchase date.

**For further details, see Journal 2(
) and Journal 3(
).**

6.7.5.2.1. Journal 2

**Refer to JOURNAL 2 in Printout Example(
).**
Journal 2 displays the additional detailed information about the last 35 communications.
Descriptions:
(1) RCV. MODE
Indicates which receive mode the unit was in when the unit received a fax message. This information is also displayed when the unit transmitted a fax message.
(2) SPEED
Indicates the speed of the communication. If multiple pages are transmitted or received, it indicates the last page's communication speed. If there is a communication error, "?" is displayed.
(3) RESOLUTION
Indicates the resolution of the communication. If multiple pages are transmitted or received, it indicates the last page's resolution. If there is a communication error, "?" is displayed.
(4) RCV-TRIG. (CNT.)
**Indicates the trigger that causes the unit to switch to the fax receive mode. The available options are listed in JOURNAL 2 in Printout Example(
). The values in parentheses indicate how many times the trigger has been used. (For example, "0003" means three times.)**

No.	Display	Function
1	FAX MODE	Means the unit received a fax message in the FAX mode.
2	MAN RCV	Means the unit received a fax message by manual operation.
3	FRN RCV	Means the unit received a fax message by friendly signal detection.
4	VOX	Means the unit detected silence or no voice.
5	RMT DTMF	Means the unit detected DTMF (Remote Fax activation code) entered remotely.
6	PAL DTMF	Means the unit detected DTMF (Remote Fax activation code) entered by a parallel connected telephone.
7	TURN-ON	Means the unit started to receive after 10 rings. (Remote Turn On: Service Code #573)
8	TIME OUT	Means the unit started to receive after Ring Time Out in the EXT-TAM or TEL /FAX mode.
9	IDENT	Means the unit detected Ring Detection.
10	CNG OGM	Means the unit detected the CNG while it was sending the Dummy Ring Back Tone in the TEL/FAX mode. OR Means the unit detected the CNG while it was sending the OGM in the ANS/ FAX mode.
11	CNG ICM	Means the unit detected the CNG while it was recording the ICM in the ANS/ FAX mode.

(5) ERROR → MEMORY

Indicates the reason why the unit received a fax message in memory.

If you look at No.11 in the JOURNAL 2 in Printout Example(

), it shows the fax message was received in memory due to "PAPER OUT" error.

[NO RESPONSE DISAPPEARED ON JOURNAL]

The "NO RESPONSE DISAPPEARED ON JOURNAL" displays the information about the last 10 communications terminated by "No Response". (Some of the communications terminated by "No Response" were not displayed in the JOURNAL.)

When a fax transmission cannot be performed because the other party's unit is set to the TEL mode, "No response" will be printed.

6.7.5.2.2. Journal 3

Refer to JOURNAL 3 in Printout Example (

).

Descriptions:

(6) ENCODE
Compression Code: MH/MR
(7) MSLT
MSLT means Minimum Scan Line Time. Used only at the factory.
(8) EQM
EQM means Eye Quality Monitor. Used only at the factory.
(9) ERROR LINE(RX)
When an error occurs while receiving a fax, this shows the number of error lines.
(10) MAKER CODE
This shows a 2 digit code of the other party's fax machine brand.
0E: "KX" model
00: Unknown
79: "UF" model
19: "Xerox" model

6.7.5.2.3. Printout Example

JOURNAL2

Mar. 25 2003 01:59PM

NO.	RCV. MODE	SPEED (CNT.)	RESOLUTION	RCV-TRIG. (CNT.)	ERROR->MEMORY
01	FAX ONLY	9600BPS	FINE.	FAX MOD	
02	FAX ONLY	9600BPS	STD.	FAX MOD	
03	FAX ONLY	9600BPS	FINE.		
04	FAX ONLY	9600BPS	FINE.	FAX MOD	
05	FAX ONLY	9600BPS	FINE.	FAX MOD	
06	FAX ONLY	9600BPS	FINE.	FAX MOD	
07	FAX ONLY	9600BPS	FINE.		
08	FAX ONLY	9600BPS	FINE.		
09	FAX ONLY	9600BPS	FINE.		
10	FAX ONLY	9600BPS	STD.	FAX MOD	
11	FAX ONLY	9600BPS	FINE.	FAX MOD	PAPER OUT
12	FAX ONLY	9600BPS	STD.	FAX MOD	
13	FAX ONLY	9600BPS	STD.		
14	FAX ONLY	?	?		
15	FAX ONLY	?	?		
16	FAX ONLY	?	?		
17	FAX ONLY	9600BPS	STD.		
18	FAX ONLY	9600BPS	FINE.	FAX MOD	
19	FAX ONLY	9600BPS	STD.	FAX MOD	
20	FAX ONLY	9600BPS	S-FINE.		
21	FAX ONLY	9600BPS	FINE.		
22	FAX ONLY	9600BPS	FINE.	FAX MOD	
23	FAX ONLY	?	?	FAX MOD	
24	FAX ONLY	9600BPS	STD.	FAX MOD	
25	FAX ONLY	9600BPS	STD.	FAX MOD	
26	FAX ONLY	9600BPS	FINE.	FAX MOD	
27	FAX ONLY	9600BPS	FINE.		
28	FAX ONLY	9600BPS	STD.	FAX MOD	
29	FAX ONLY	9600BPS	FINE.	FAX MOD	
30	FAX ONLY	9600BPS	S-FINE.	FAX MOD	
31	FAX ONLY	9600BPS	STD.	FAX MOD	
32	FAX ONLY	9600BPS	STD.	FAX MOD	
33	FAX ONLY	?	?	FAX MOD	
34	FAX ONLY	9600BPS	STD.	FAX MOD	
35	FAX ONLY	9600BPS	STD.	FAX MOD	

NO RESPONSE DISAPPEARED ON JOURNAL

NO.	START TIME	RCV MODE	RCV-TRIG. (CNT.)

JOURNAL3

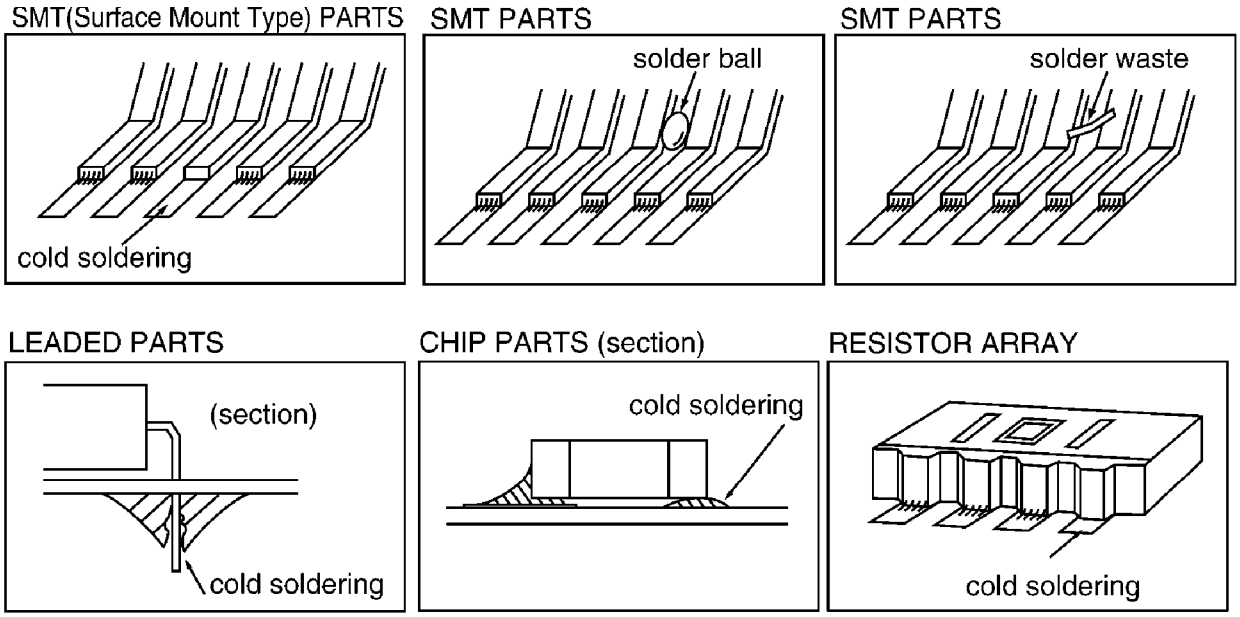
Mar. 25 2003 01:58PM

NO.	ENCODE	MSLT	EQM(RX)	ERROR LINE(RX)	MAKER CODE
01	MR	10msec	007A	00000	0E
02	MR	20msec	016B	00000	00
03	MH	10msec	0000	00000	00
04	MR	20msec	019B	00003	00
05	MR	20msec	0156	00011	00
06	MR	20msec	0113	00000	00
07	MR	5msec	0000	00000	79
08	MR	5msec	0000	00000	79
09	MR	0msec	0000	00000	19
10	MR	20msec	0100	00000	00
11	MR	10msec	0073	00000	0E
12	MR	20msec	012B	00000	00
13	MH	20msec	0000	00000	79
14	MH	20msec	0000	00000	00
15	MH	20msec	0000	00000	00
16	MH	20msec	0000	00000	00
17	MR	5msec	0000	00000	79
18	MR	10msec	00AB	00004	0E
19	MR	20msec	0124	00000	00
20	MR	20msec	0000	00000	00
21	MR	20msec	0000	00000	00
22	MR	20msec	0135	00000	00
23	MR	20msec	0000	00000	00
24	MR	20msec	01BC	00000	00
25	MR	20msec	01AC	00000	00
26	MR	20msec	020F	00000	00
27	MR	10msec	0000	00000	0E
28	MR	20msec	01DF	00000	00
29	MR	20msec	01EA	00000	00
30	MR	20msec	00CD	00000	00
31	MR	20msec	02F8	00000	0E
32	MR	10msec	04F8	00000	0E
33	MR	10msec	0000	00000	00
34	MR	20msec	03B6	00000	0E
35	MH	20msec	00E0	00000	00

6.7.6. DIGITAL BOARD SECTION

When the unit fails to boot up the system, take the troubleshooting procedures very carefully. It may have a serious problem.
The symptom: No response when the power is turned on. (No LCD display, and keys are not accepted.)
The first step is to check the power source. If there is no problem with the power supply unit, the problem may lie in the digital unit (main board).
As there are many potential causes in this case (ASIC, DRAM, etc.), it may be difficult to specify what you should check first. If a mistake is made in the order of checks, a normal part may be determined faulty, wasting both time and money.
Although the tendency is to regard the problem as a serious one (IC malfunction, etc.), usually most cases are caused by solder faults (poor contact due to a tunnel

in the solder, signal short circuit due to solder waste).



Note:

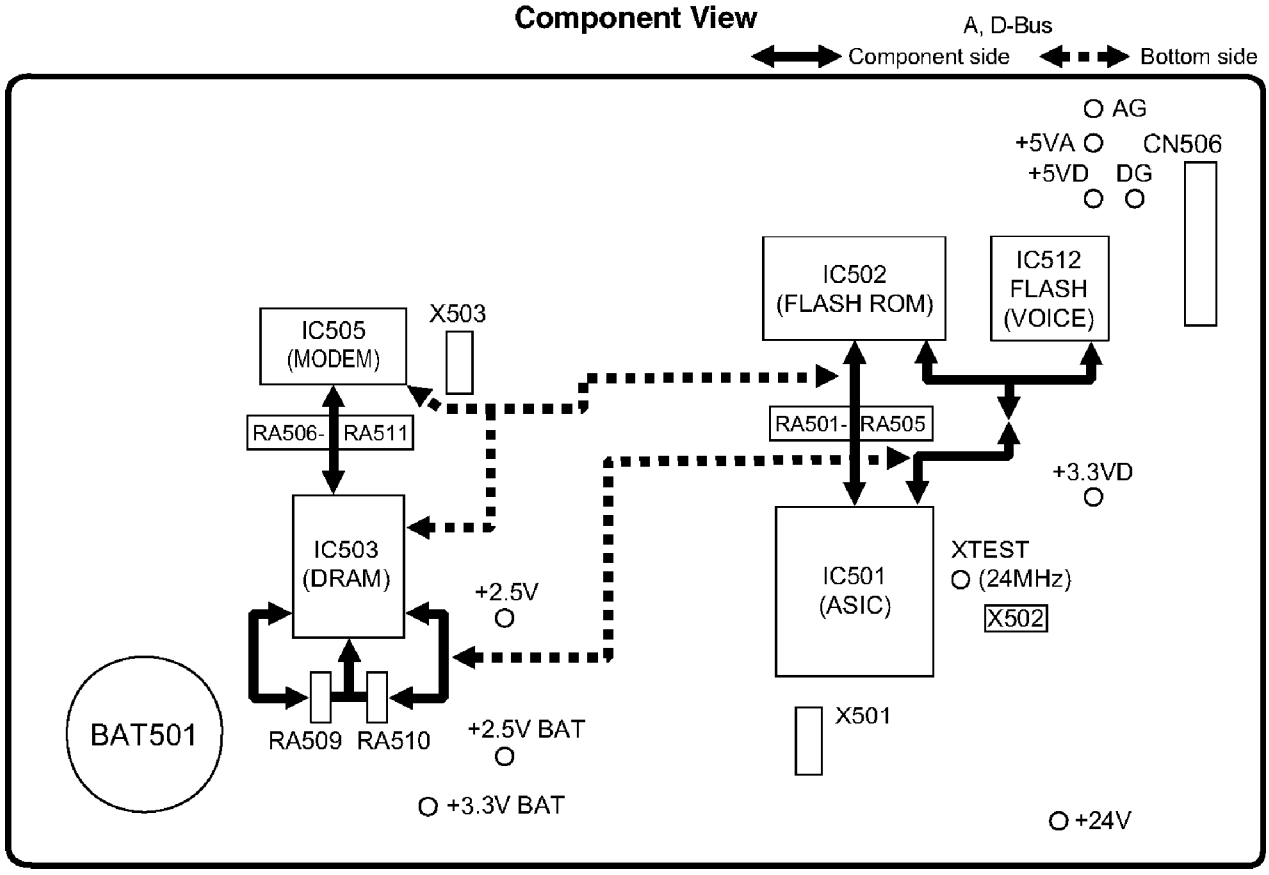
1. **Electrical continuity may have existed at the factory check, but a faulty contact occurred as a result of vibration, etc., during transport.**
2. **Solder waste remaining on the board may get caught under the IC during transport, causing a short circuit.**

Before we begin mass production, several hundred trial units are produced at the plant, various tests are applied and any malfunctions are analyzed. (In past experiences, digital IC (especially DRAM and FLASH ROM) malfunctions are extremely rare after installation in the product.)
This may be repaired by replacing the IC, (DRAM etc.). However, the real cause may not have been an IC malfunction but a soldering fault instead.
Soldering faults difficult to detect with the naked eye are common, particularly for ASIC and RA (Resistor Array). But if you have an oscilloscope, you can easily determine the problem site or IC malfunction by checking the main signal lines.
Even if you don't have such a measuring instrument, by checking each main signal line and resoldering it, in many cases the problem will be resolved.
An explanation of the main signals (for booting up the unit) is presented below.

Don’t replace ICs or stop repairing until checking the signal lines.
An IC malfunction rarely occurs. (By understanding the necessary signals for booting up the unit, the “Not Boot up” display is not a serious problem.)

What are the main signals for booting up the unit?
Please refer to Digital Block Diagram (
).
The ASIC (IC501) controls all the other digital ICs. When the power is turned on, the ASIC retrieves the operation code stored in the FLASH ROM (IC502), then follows the instructions for controlling each IC. All ICs have some inner registers that are assigned to a certain address.
It is the address bus by which the ASIC designates the location inside each IC. And the data bus reads or writes the data in order to transmit the instructions from the ASIC to the ICs.
These signal lines are all controlled by voltages of 3.3V (H) or 0V (L).

6.7.6.1. Digital Block Diagram



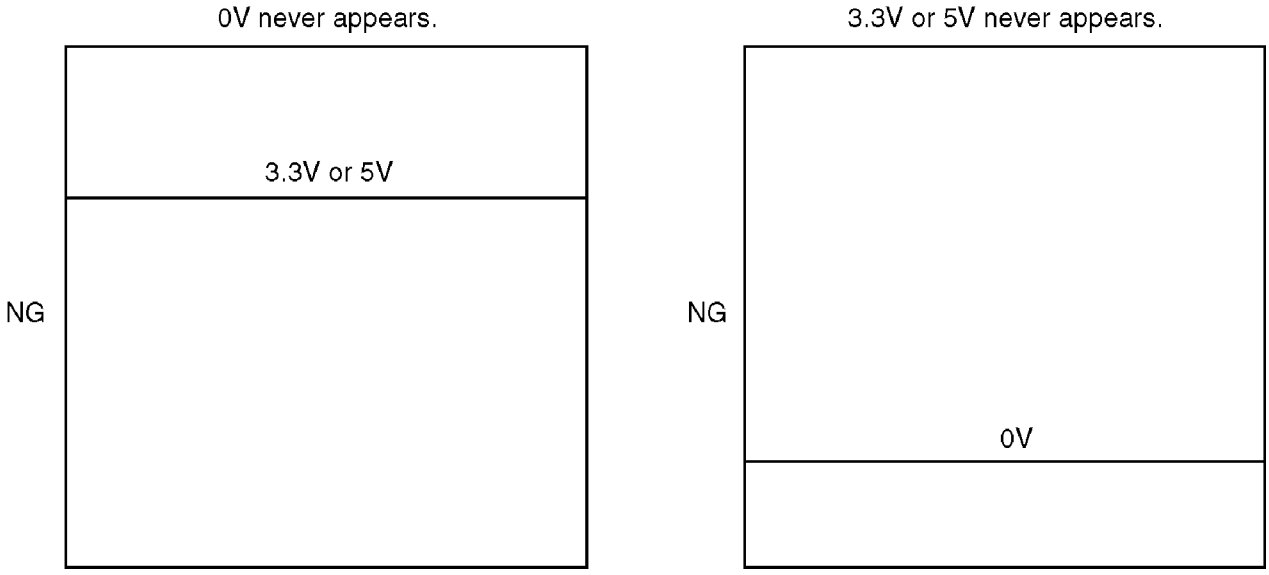
You also need to check the signal lines listed here [List 1] when the unit fails to boot up the system. Those signal lines should remain normal. Other signal lines are not directly related to that failure even if they have faults or troubles.

[List 1]

①	D0～D7	(Data Bus)
②	A0～A15	(Address Bus)
③	$\overline{RD}$	(Read Signal)
	$\overline{ROMCS}$	(ROM Select Signal)
	$\overline{WR}$	(Write Signal)
④	RBA0～RBA5	(Bank Address Signal)
⑤	$\overline{RAS}$	(DRAM Row Address Strobe Signal)
	$\overline{CAS}$	(DRAM Column Address Strobe Signal)
⑥	$\overline{MDMCS}$	(Modem Select Signal)

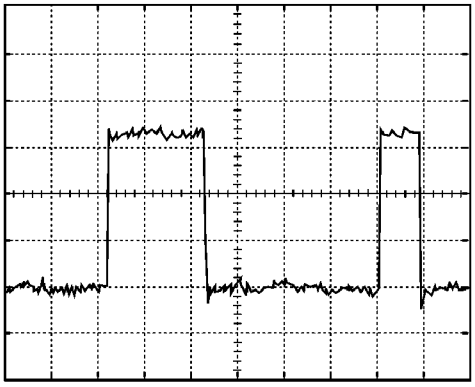
As long as these signals remain normal, once the power is turned on, each IC can repeatedly output 3.3V (H) and 0V (L). The following shows NG and normal wave patterns.

NG Wave pattern (Refer to NG EXAMPLE)

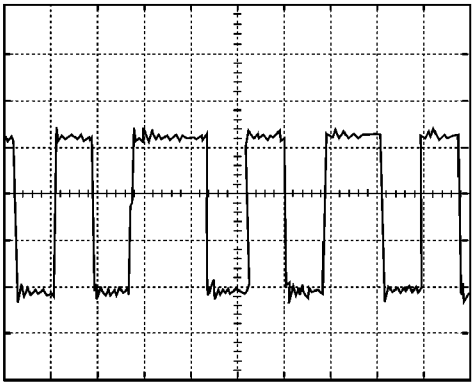


Normal Wave Patterns

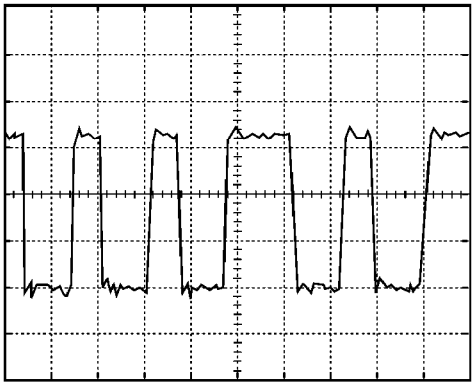
① D0~D7 200ns/div, 1V/div



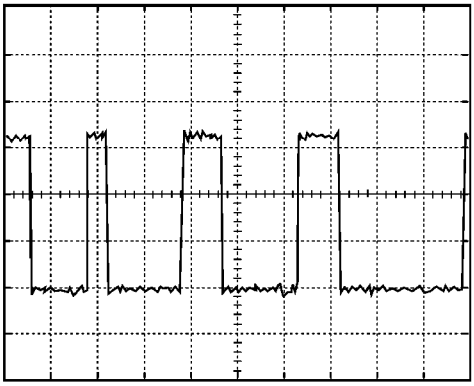
② A0~A5 200ns/div, 1V/div



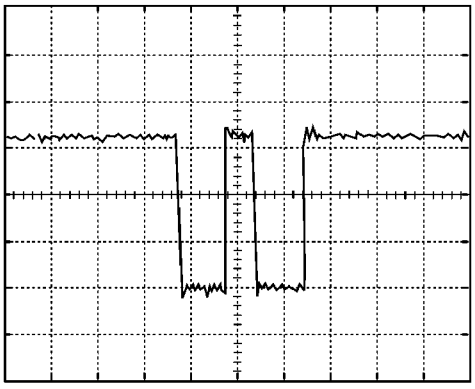
③ $\overline{RD}$ 100ns/div, 1V/div



④ $\overline{ROMCS}$ 400ns/div, 1V/div



⑤ $\overline{RAS}$, $\overline{CAS}$ 100ns/div, 1V/div

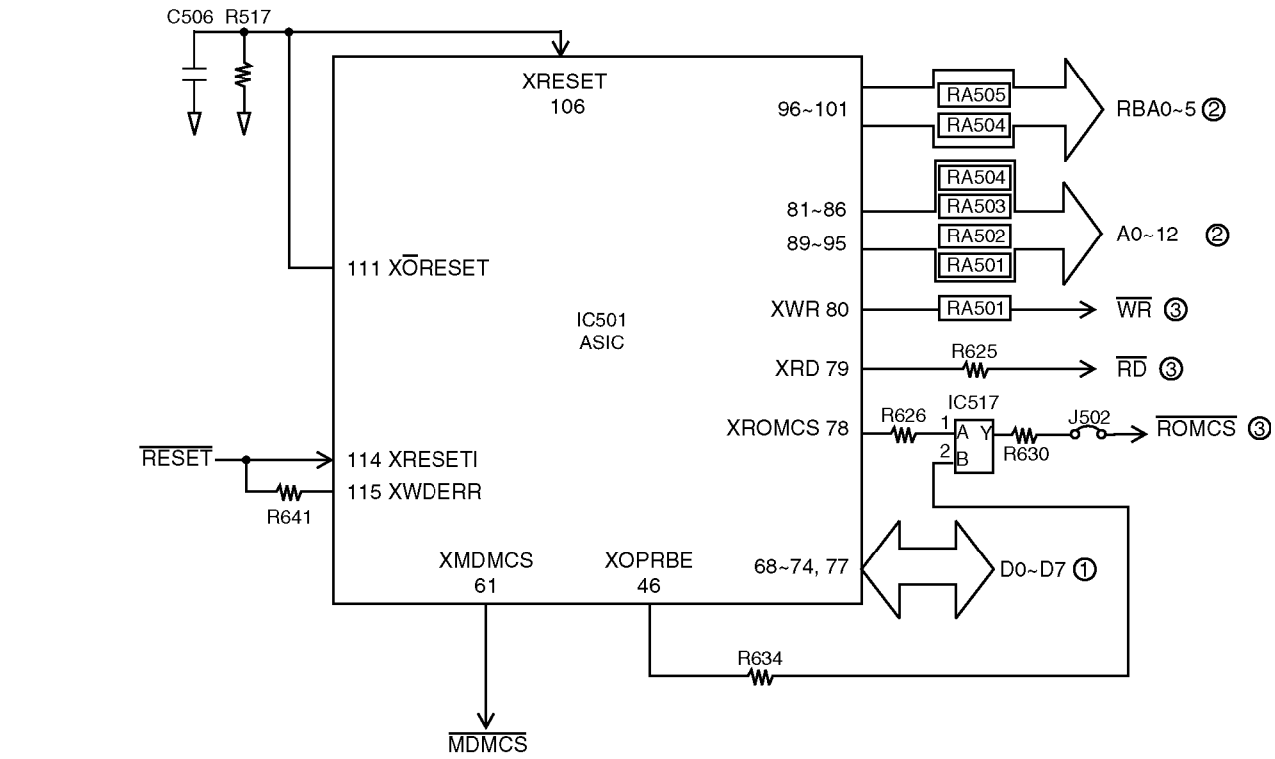


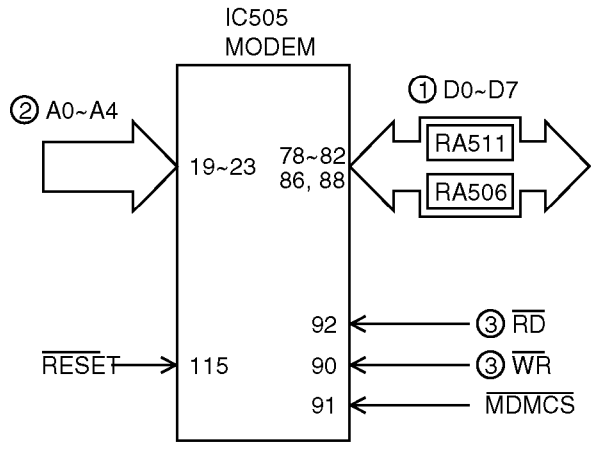
Remarks:

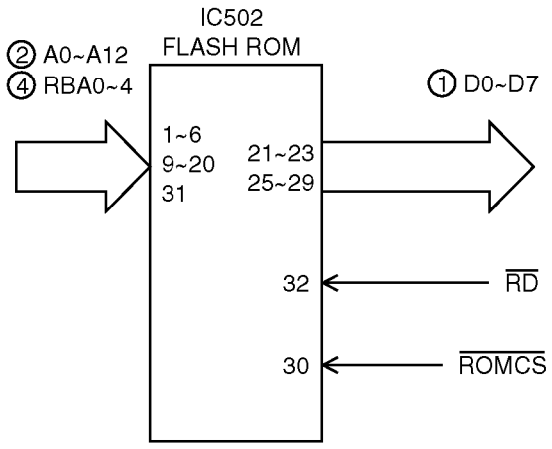
When you use an oscilloscope to judge whether a signal to be tested is normal or NG, perform the signal check in exactly the same order as in [List 1]. (If the ASIC fails to access the FLASH ROM, the ASIC cannot access DRAM normally.)
The digital circuit actually operates according to the timing combinations of these signals. If the timing of these signals is even slightly delayed, the circuit will not work. Nor will it if the IC is defective and the output voltage level is not normal although the timing of these signals is accurate enough to meet the specifications. (Make sure that your oscilloscope is calibrated before starting a test.)
Therefore, it is imperative to confirm whether each IC outputs the signal at the correct level. (See the I/O Pin No. Diagram.) The signal level should be constantly output at between 3.3V (H) and 0V (L) as described earlier.

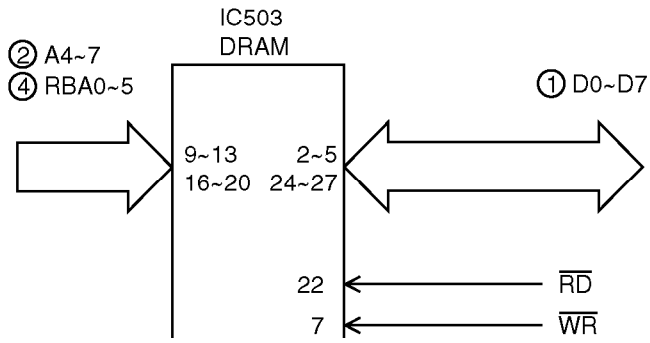
Note:
Simply check the output level and make sure if the IC repeatedly outputs the signal at between 3.3V (H) and 0V (L).

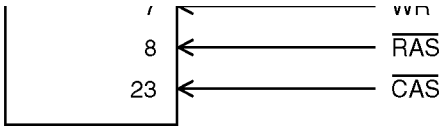
I/O and Pin No. Diagram


C506 R517
XRESET
106
96~101
RA505
RA504
RBA0~5 ②
RA504
RA503
81~86
89~95
RA502
RA501
A0~12 ②
111 XORESET
IC501
ASIC
XWR 80
RA501
WR ③
R625
XRD 79
RD ③
IC517
R626
XROMCS 78
J502
ROMCS ③
R630
RESET
114 XRESETI
115 XWDERR
R641
XMDMCS
61
XOPRBE
46
68~74, 77
D0~D7 ①
R634
MDMCS

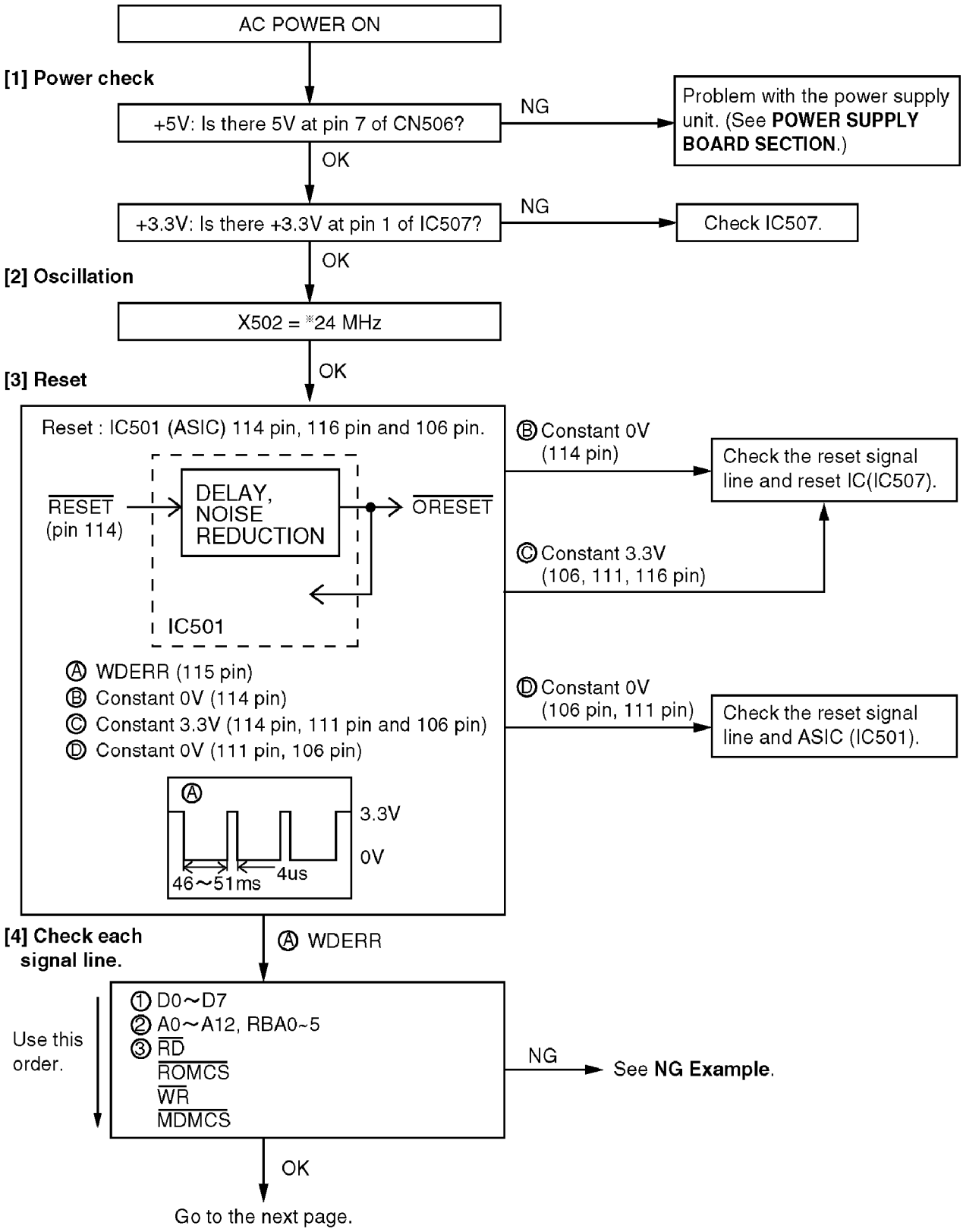

IC505
MODEM
② A0~A4
① D0~D7
19~23
78~82
86, 88
RA511
RA506
92
③ RD
RESET
115
90
③ WR
91
MDMCS


IC502
FLASH ROM
② A0~A12
④ RBA0~4
① D0~D7
1~6
9~20
31
21~23
25~29
32
RD
30
ROMCS

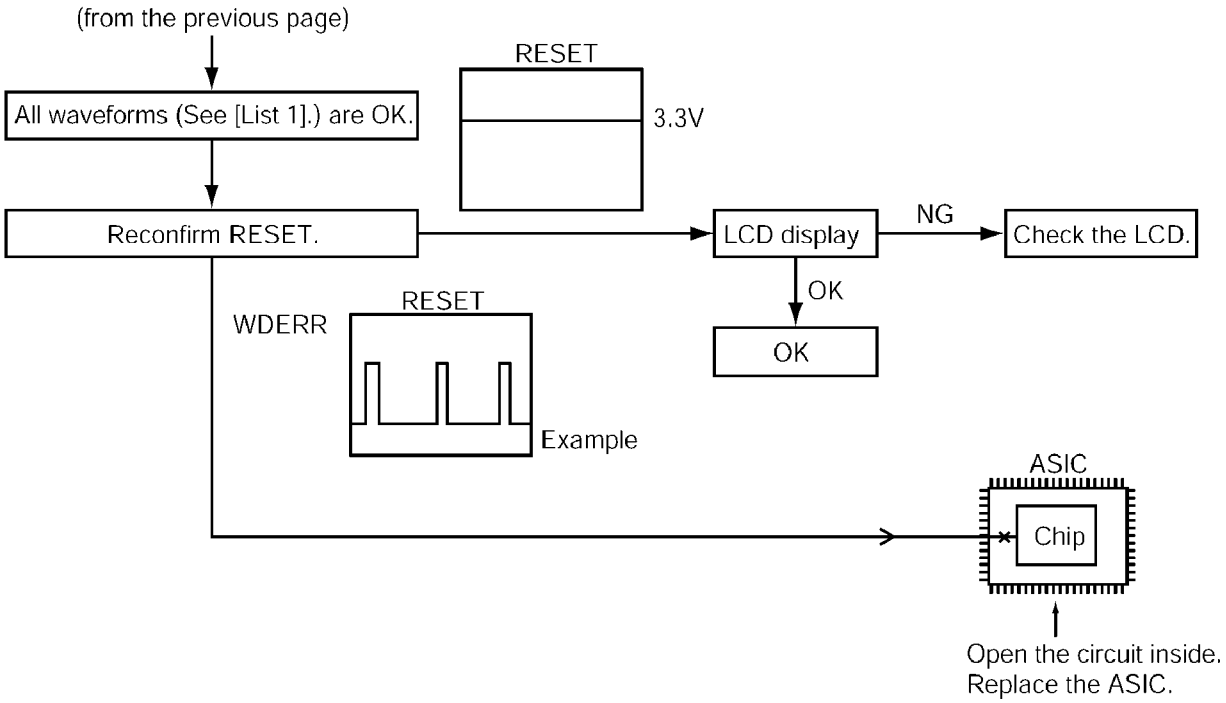

IC503
DRAM
② A4~7
④ RBA0~5
① D0~D7
9~13
16~20
2~5
24~27
22
RD
7
WR



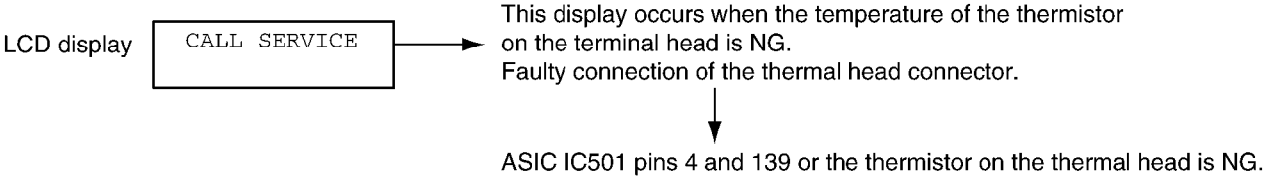
After the power is turned on, the ASIC initializes and checks each IC.
The ROM, DRAM, and modem are checked.
If initialization fails for the ICs, the system will not boot up.
In this case, please find the cause as follows.


AC POWER ON
[1] Power check
+5V: Is there 5V at pin 7 of CN506?
NG
Problem with the power supply unit. (See POWER SUPPLY BOARD SECTION.)
OK
+3.3V: Is there +3.3V at pin 1 of IC507?
NG
Check IC507.
OK
[2] Oscillation
X502 = ※24 MHz
OK
[3] Reset
Reset : IC501 (ASIC) 114 pin, 116 pin and 106 pin.
RESET (pin 114)
DELAY, NOISE REDUCTION
ORESET
IC501
Ⓐ WDERR (115 pin)
Ⓑ Constant 0V (114 pin)
Ⓒ Constant 3.3V (114 pin, 111 pin and 106 pin)
Ⓓ Constant 0V (111 pin, 106 pin)
Ⓐ
3.3V
0V
46~51ms
4us
Ⓑ Constant 0V (114 pin)
Check the reset signal line and reset IC(IC507).
Ⓒ Constant 3.3V (106, 111, 116 pin)
Ⓓ Constant 0V (106 pin, 111 pin)
Check the reset signal line and ASIC (IC501).
[4] Check each signal line.
Ⓐ WDERR
Use this order.
① D0~D7
② A0~A12, RBA0~5
③ RD
ROMCS
WR
MDMCS
NG
See NG Example.
OK
Go to the next page.

CROSS REFERENCE:
NG Example(
)
POWER SUPPLY BOARD SECTION(
)

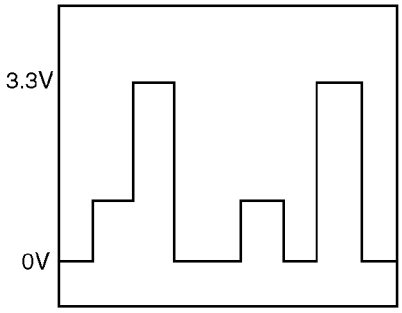


Other NG example while the power is ON and the LCD displays the following.

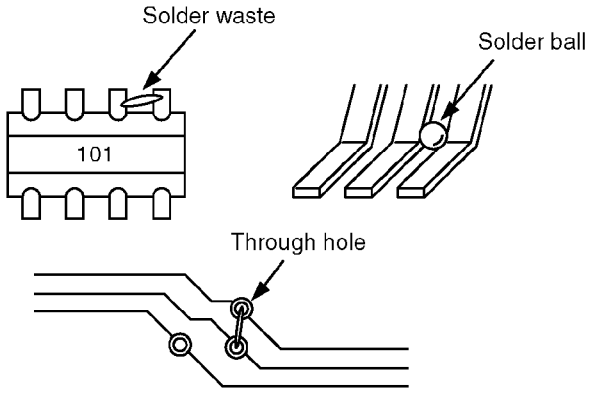

LCD display
CALL SERVICE
This display occurs when the temperature of the thermistor on the terminal head is NG.
Faulty connection of the thermal head connector.
ASIC IC501 pins 4 and 139 or the thermistor on the thermal head is NG.

6.7.6.2. NG Example

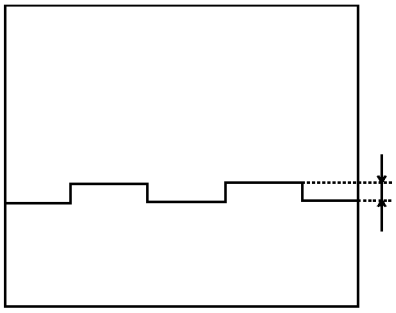
1.



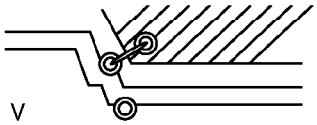
Short circuit from the adjacent signal wires.
Check for a short circuit in the RA and IC leads and the signal wire at the through hole.



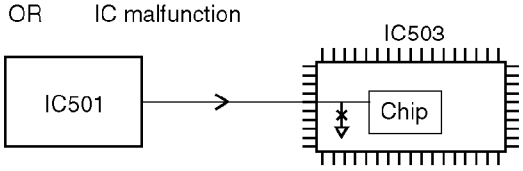
2.



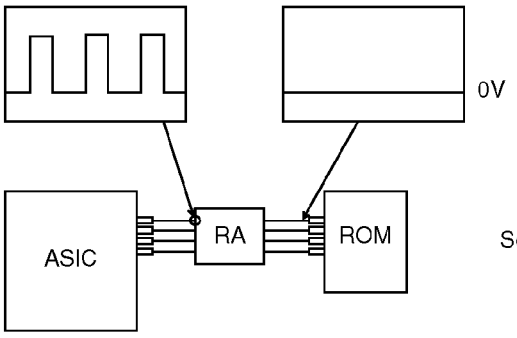
Short between the signal line and GND.



OR IC malfunction



3.

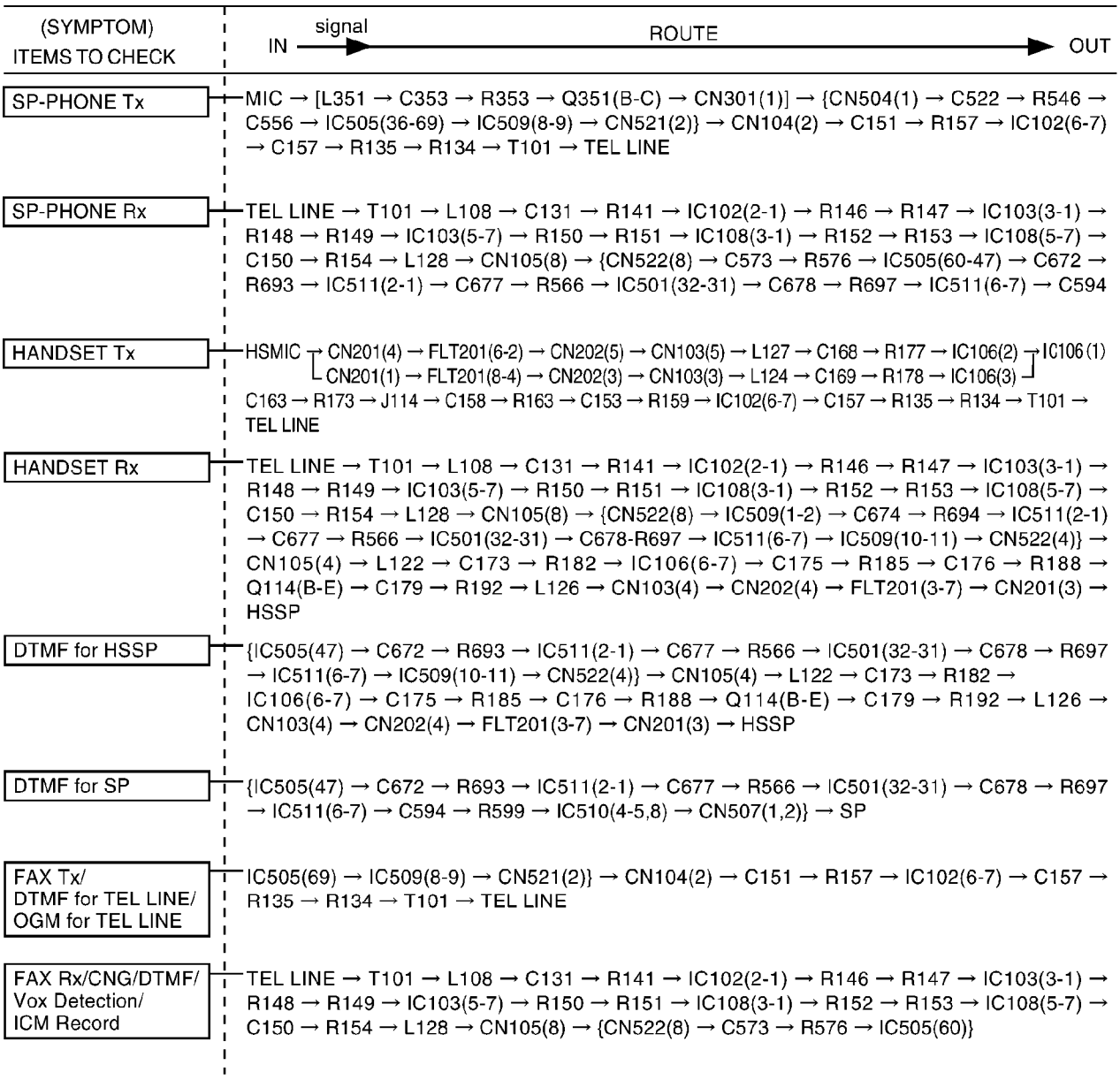


Solder fault on RA.

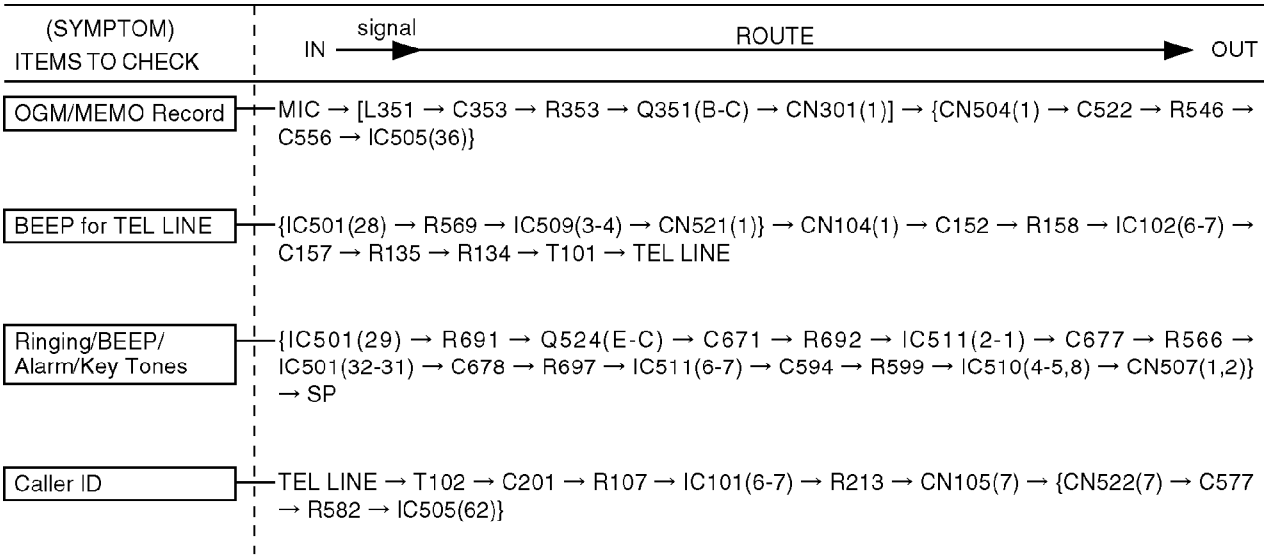
6.7.7. ANALOG BOARD SECTION

This chapter provides the testing procedures required for the analog parts. A signal route to be tested is determined depending upon purposes. For example, the handset TX route begins at the handset microphone and the signal is output to the telephone line. The signal mainly flowing on this route is analog. You can trace the signal with an oscilloscope. The signal flow on each route is shown in the Check Sheet here. If you find a specific problem in the unit, for example if you cannot communicate with the SP-PHONE, trace that signal route locally with the following Check Sheet and locate the faulty point.

6.7.7.1. Check Sheet for Signal Route



Note:
{ }: Inside the digital board
[ ]: Inside the operation board

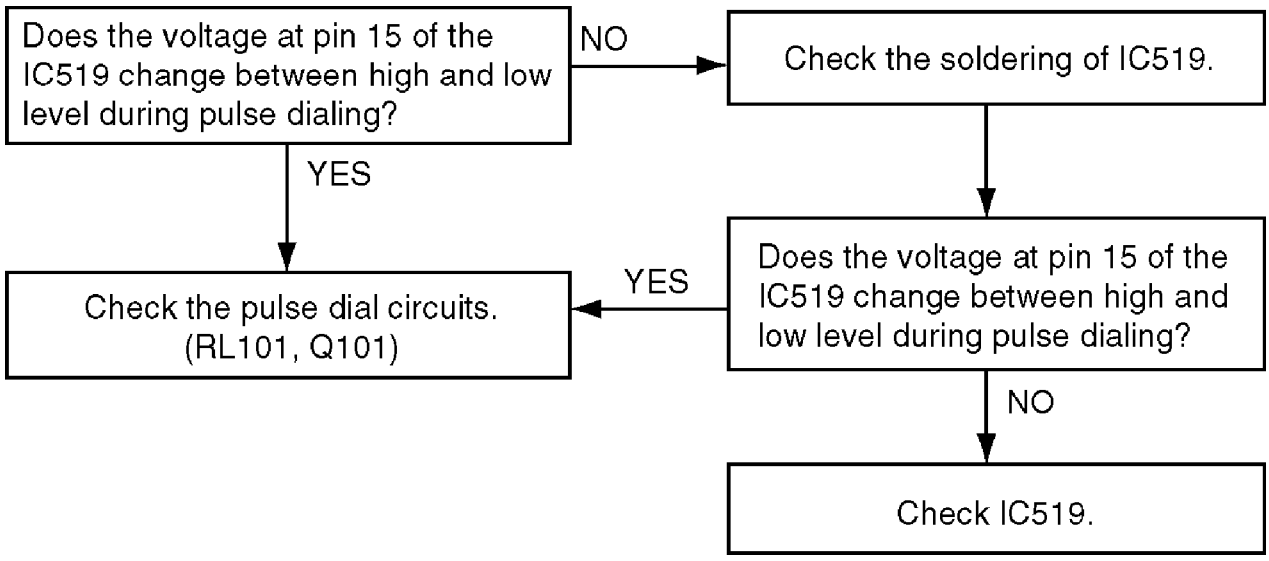

(SYMPTOM)
ITEMS TO CHECK
IN
signal
ROUTE
OUT
OGM/MEMO Record
MIC → [L351 → C353 → R353 → Q351(B-C) → CN301(1)] → {CN504(1) → C522 → R546 → C556 → IC505(36)}
BEEP for TEL LINE
{IC501(28) → R569 → IC509(3-4) → CN521(1)} → CN104(1) → C152 → R158 → IC102(6-7) → C157 → R135 → R134 → T101 → TEL LINE
Ringing/BEEP/
Alarm/Key Tones
{IC501(29) → R691 → Q524(E-C) → C671 → R692 → IC511(2-1) → C677 → R566 → IC501(32-31) → C678 → R697 → IC511(6-7) → C594 → R599 → IC510(4-5,8) → CN507(1,2)} → SP
Caller ID
TEL LINE → T102 → C201 → R107 → IC101(6-7) → R213 → CN105(7) → {CN522(7) → C577 → R582 → IC505(62)}

Note:
{ }: Inside the digital board
[ ]: Inside the operation board

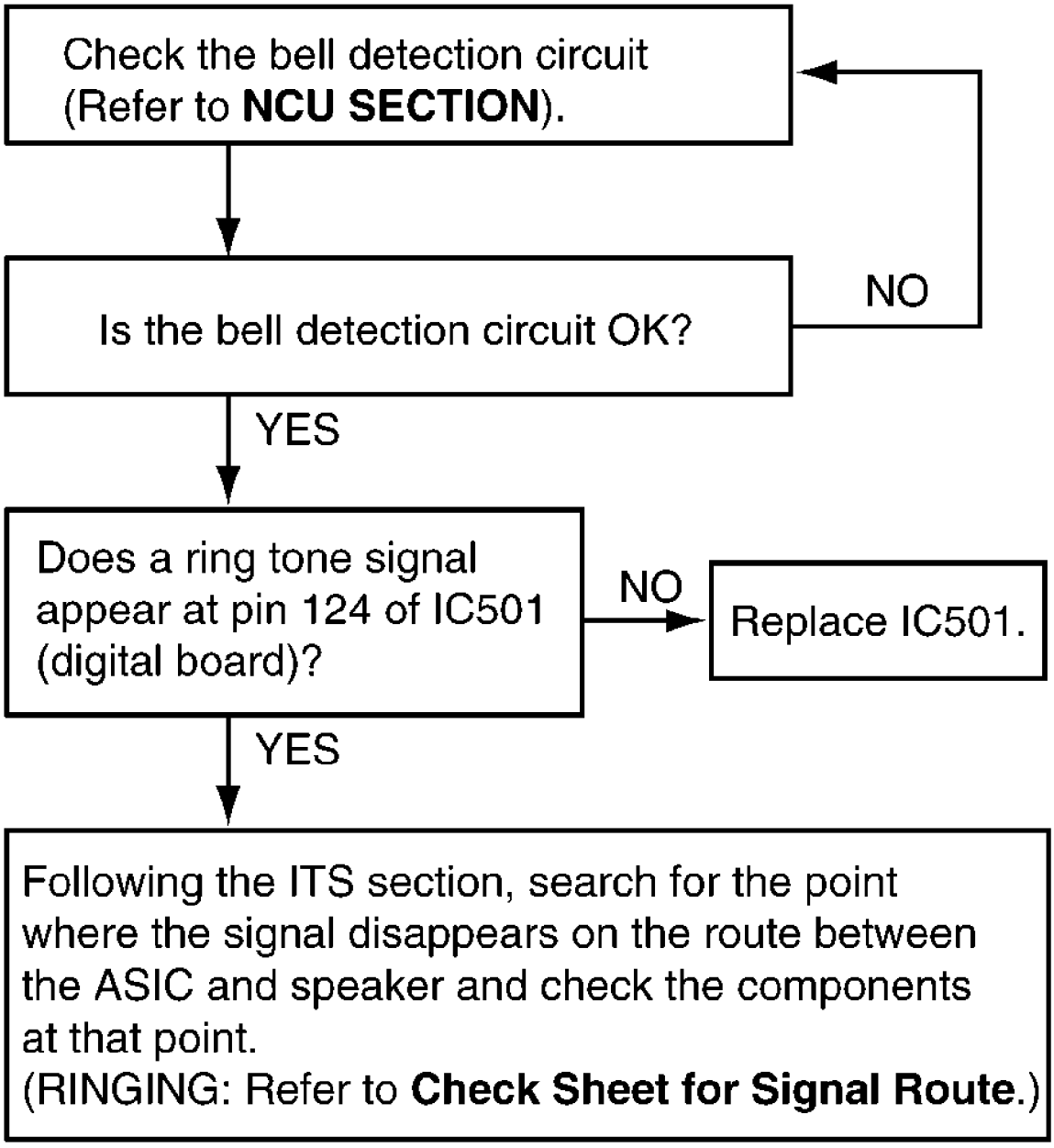
6.7.7.2. Defective fax NCU section

1. No Speakerphone and no monitor reception
Perform a signal test in the FAX NCU section and locate a defective point (where the signal disappears) on each route between the microphone and the telephone line (sending), or between the telephone line and the speaker (receiving). Check the components at that point. Check Sheet for Signal Route(
) is useful for this investigation.

2. No pulse dialing


Does the voltage at pin 15 of the IC519 change between high and low level during pulse dialing?
NO
Check the soldering of IC519.
YES
Does the voltage at pin 15 of the IC519 change between high and low level during pulse dialing?
YES
Check the pulse dial circuits. (RL101, Q101)
NO
Check IC519.

3. No ring tone (or No bell)


Check the bell detection circuit (Refer to **NCU SECTION**).
Is the bell detection circuit OK?
NO
YES
Does a ring tone signal appear at pin 124 of IC501 (digital board)?
NO
Replace IC501.
YES
Following the ITS section, search for the point where the signal disappears on the route between the ASIC and speaker and check the components at that point.
(RINGING: Refer to **Check Sheet for Signal Route**.)

CROSS REFERENCE:

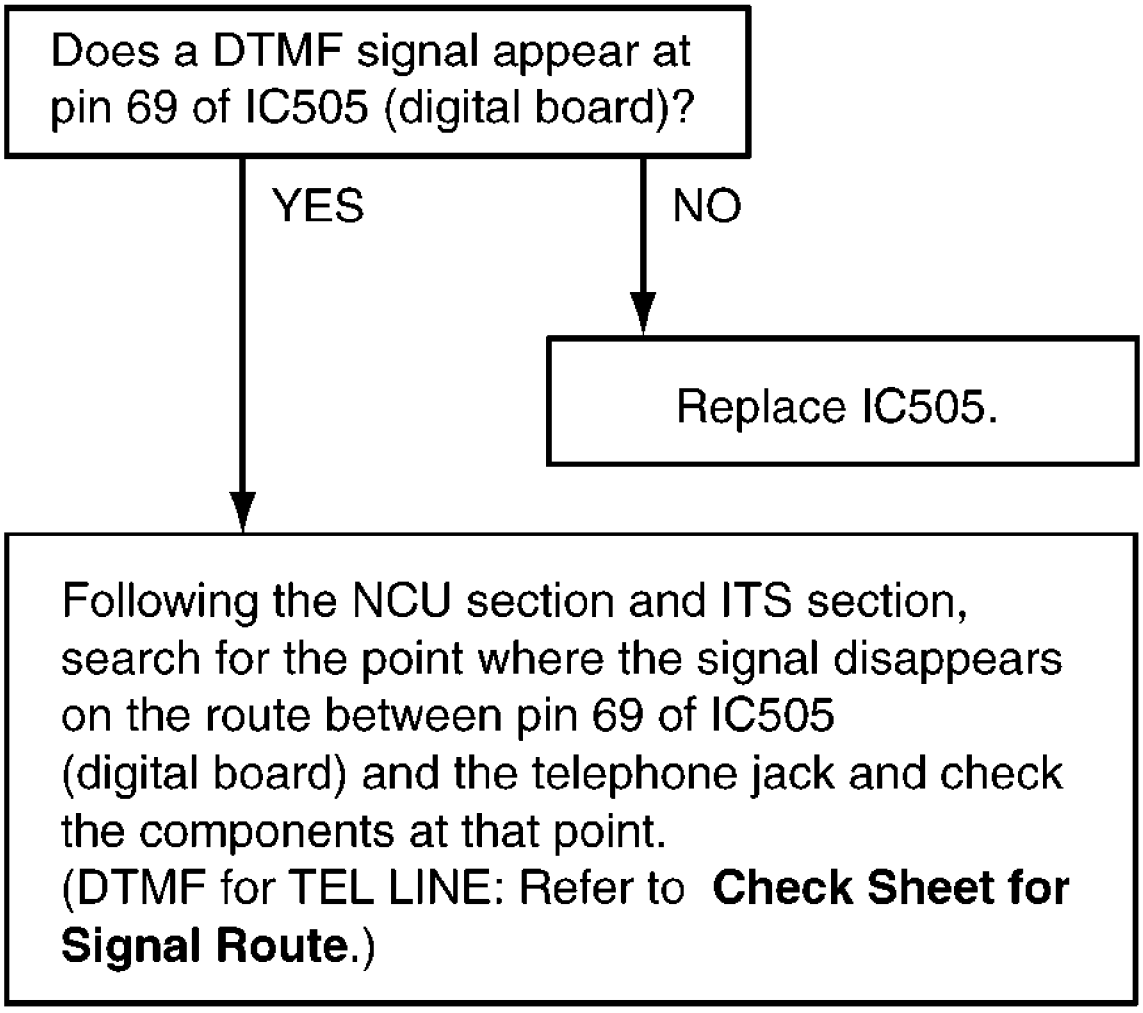
Check Sheet for Signal Route(

)

NCU SECTION(

)

4. No tone dialing


Does a DTMF signal appear at pin 69 of IC505 (digital board)?
YES
NO
Replace IC505.
Following the NCU section and ITS section, search for the point where the signal disappears on the route between pin 69 of IC505 (digital board) and the telephone jack and check the components at that point.
(DTMF for TEL LINE: Refer to Check Sheet for Signal Route.)

CROSS REFERENCE:
Check Sheet for Signal Route(
)

6.7.8. POWER SUPPLY BOARD SECTION

6.7.8.1. Key components for troubleshooting

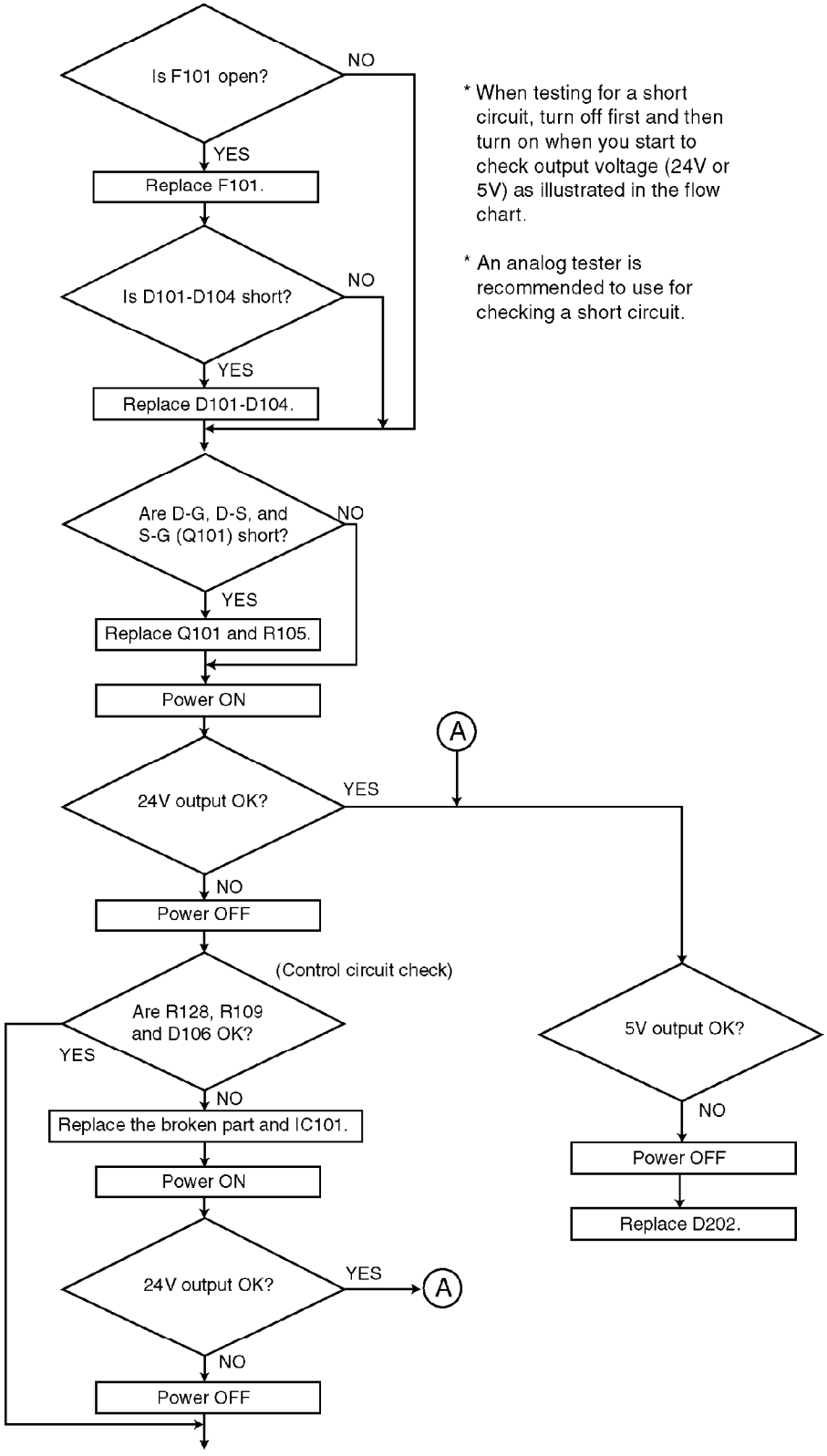
Check the following parts first: F101, D101-D104, C106, Q101, PC101 and IC101. This comes from our experience with experimental tests. For example: power supply and lightning surge voltage test, withstanding voltage test, intentional short circuit test, etc.

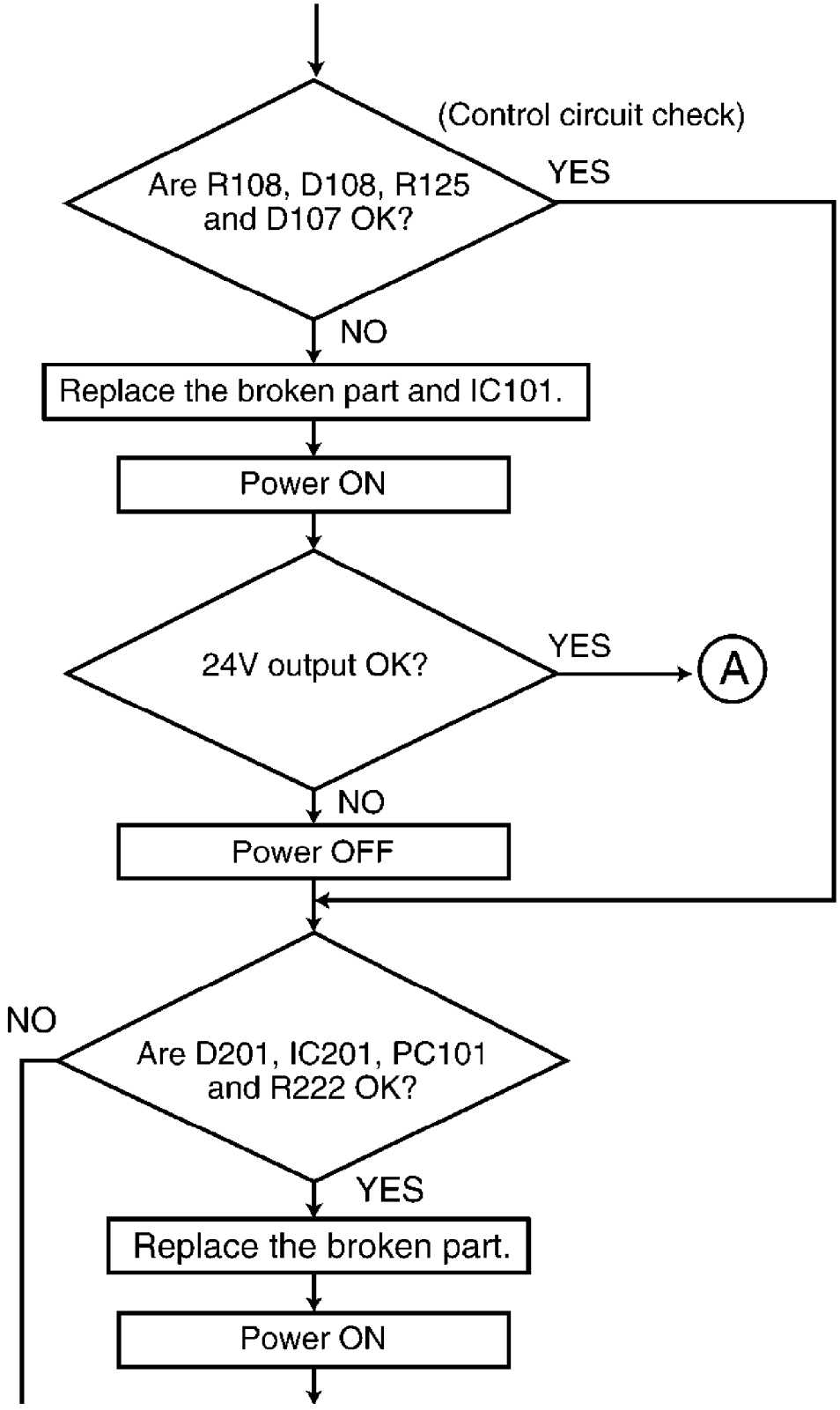
Caution:

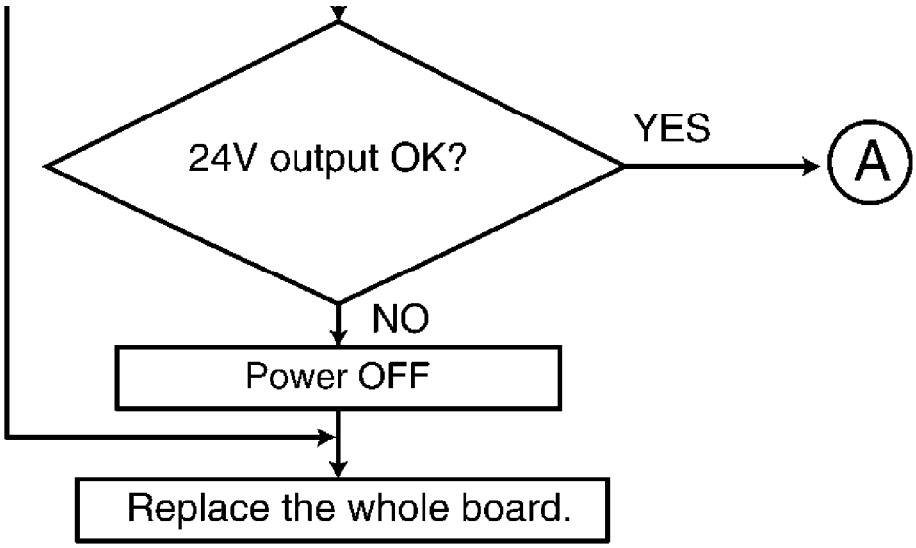
If you find a melted fuse in the unit, do not turn on the power until you locate and repair the faulty parts (except for the fuse);
otherwise the fuse will melt again and you cannot pinpoint the faulty point.

In most cases, the symptom is that nothing is output. It is more likely that the fault is in the primary side rather than the secondary side. Check the primary side first.

6.7.8.2. Troubleshooting Flow Chart


Is F101 open?
NO
YES
Replace F101.
Is D101-D104 short?
NO
YES
Replace D101-D104.
Are D-G, D-S, and S-G (Q101) short?
NO
YES
Replace Q101 and R105.
Power ON
A
24V output OK?
YES
NO
Power OFF
(Control circuit check)
Are R128, R109 and D106 OK?
YES
NO
Replace the broken part and IC101.
Power ON
24V output OK?
YES
A
NO
Power OFF
5V output OK?
NO
Power OFF
Replace D202.
* When testing for a short circuit, turn off first and then turn on when you start to check output voltage (24V or 5V) as illustrated in the flow chart.
* An analog tester is recommended to use for checking a short circuit.


(Control circuit check)
Are R108, D108, R125 and D107 OK?
YES
NO
Replace the broken part and IC101.
Power ON
24V output OK?
YES
A
NO
Power OFF
NO
Are D201, IC201, PC101 and R222 OK?
YES
Replace the broken part.
Power ON

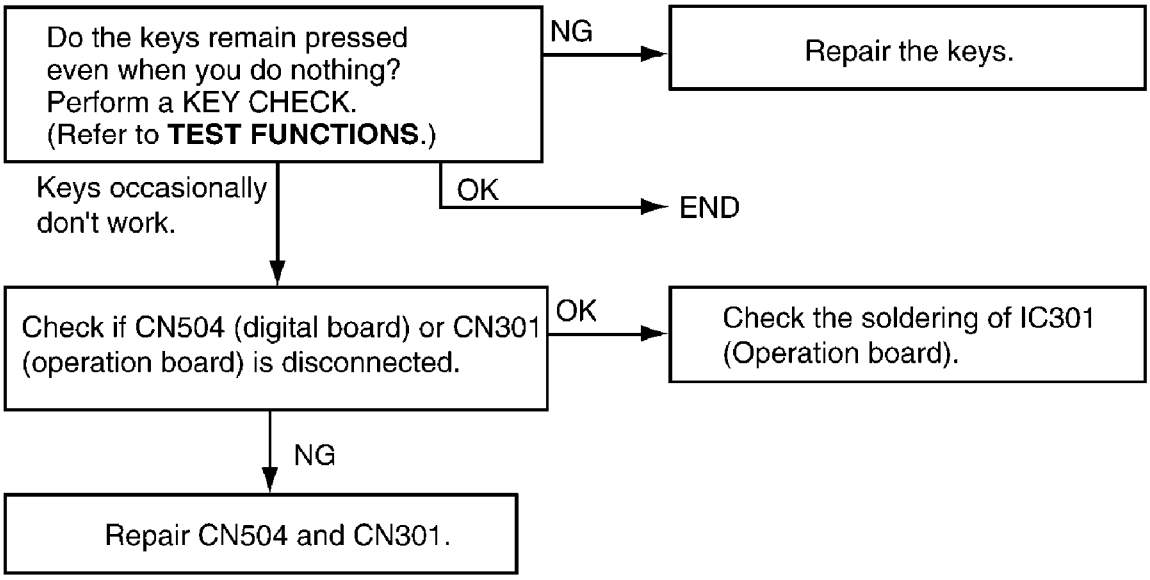


6.7.8.3. Broken Parts Repair Details

(D101, D102, D103, D104)
Check for a short-circuit in terminal 4. If D101, D102, D103 and D104 are short-circuits, F101 will melt (open).
In this case, replace all of the parts (D101, D102, D103, D104, F101).
(Q101)
The worst case of Q101 is a short-circuit between the Drain and Gate because damage expands to the peripheral circuit of Q101.
This is due to a very high voltage through the Gate circuit which is composed of R128, R109, D106 and IC101.
You should change all of the parts listed as follows.
F101, Q101, R128, R109, D106, IC101
(D201)
If D201 is broken, the oscillation circuit in the power supply cannot operate. Check it with an electric tester.

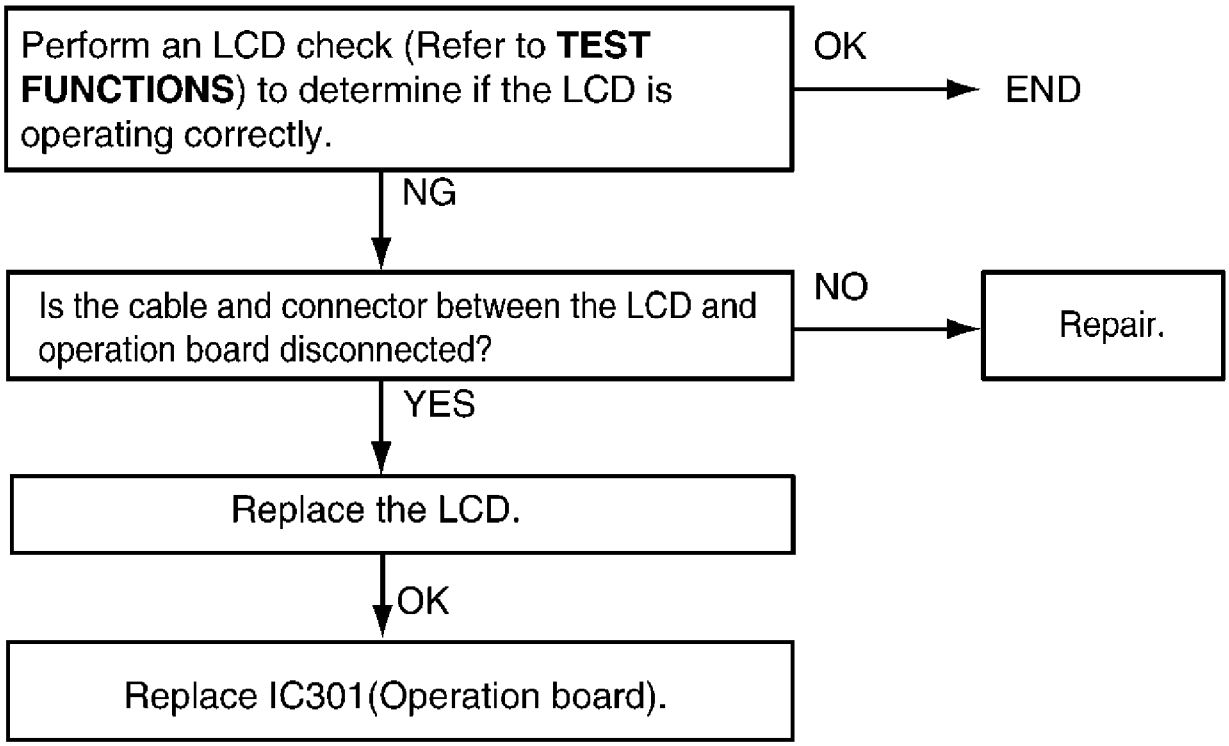
6.7.9. OPERATION PANEL SECTION

6.7.9.1. No Key Operation


Do the keys remain pressed even when you do nothing? Perform a KEY CHECK. (Refer to **TEST FUNCTIONS**.)
NG
Repair the keys.
Keys occasionally don't work.
OK
END
Check if CN504 (digital board) or CN301 (operation board) is disconnected.
OK
Check the soldering of IC301 (Operation board).
NG
Repair CN504 and CN301.

CROSS REFERENCE:
TEST FUNCTIONS(
)

6.7.9.2. No LCD Indication

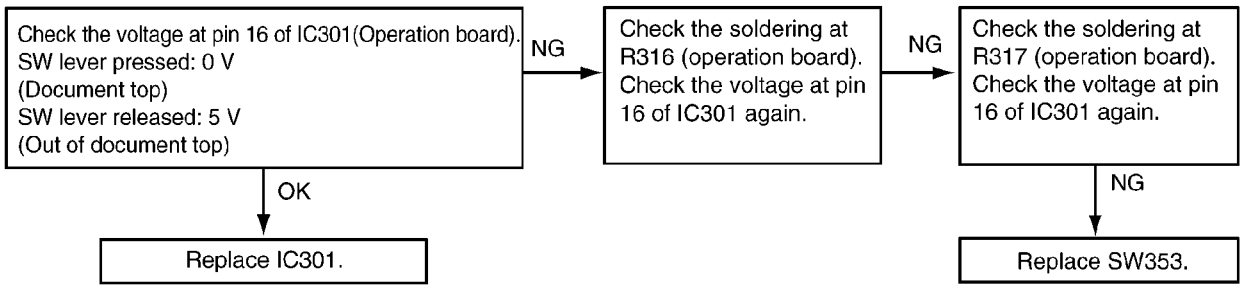


CROSS REFERENCE:
TEST FUNCTIONS(
)

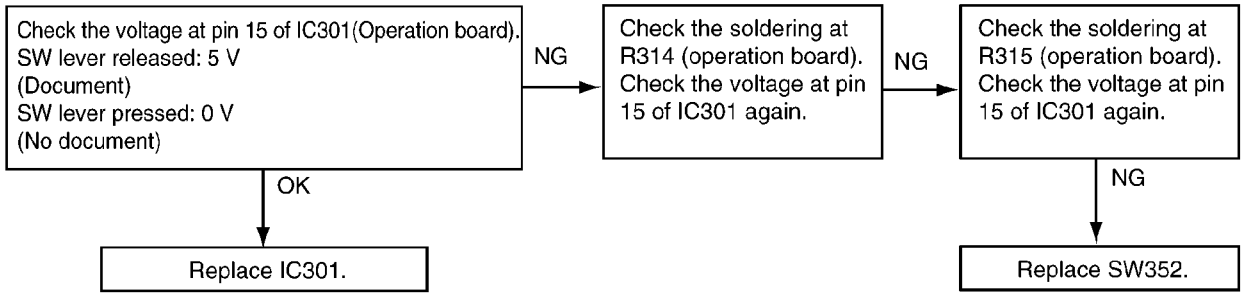
6.7.10. SENSOR SECTION

Refer to SENSORS AND SWITCHES(
) for the circuit descriptions.
The Test Function makes the sensor circuit check easier. (Refer to TEST FUNCTIONS(
).)
For example, as for "COVER OPEN SENSOR", "CO" is turned ON/OFF on the display when you open or close the front cover. Also, document sensor, read position sensor, recording paper sensor and jam sensor are turned ON/OFF by the copy operation. Therefore, each sensor can be checked for proper mechanical operation.
As for the electric check, check whether each voltage is right or not with following flowchart turning each sensor lever ON/OFF manually.

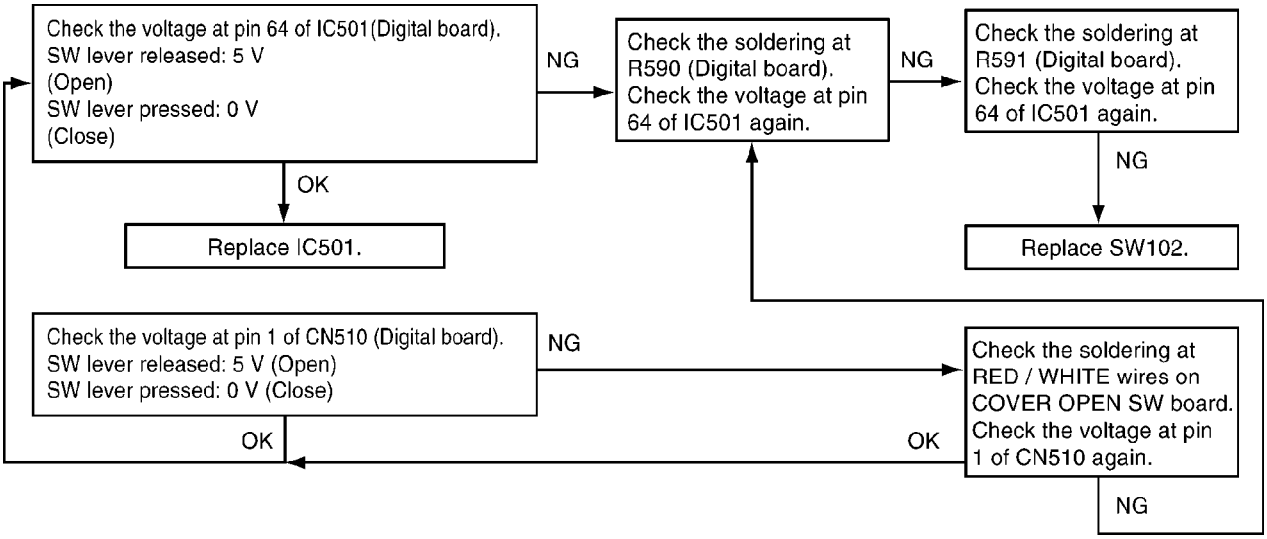
6.7.10.1. Check the Document Top SW (SW353)....."REMOVE DOCUMENT"


Check the voltage at pin 16 of IC301(Operation board).
SW lever pressed: 0 V
(Document top)
SW lever released: 5 V
(Out of document top)
NG
Check the soldering at R316 (operation board). Check the voltage at pin 16 of IC301 again.
NG
Check the soldering at R317 (operation board). Check the voltage at pin 16 of IC301 again.
NG
Replace SW353.
OK
Replace IC301.

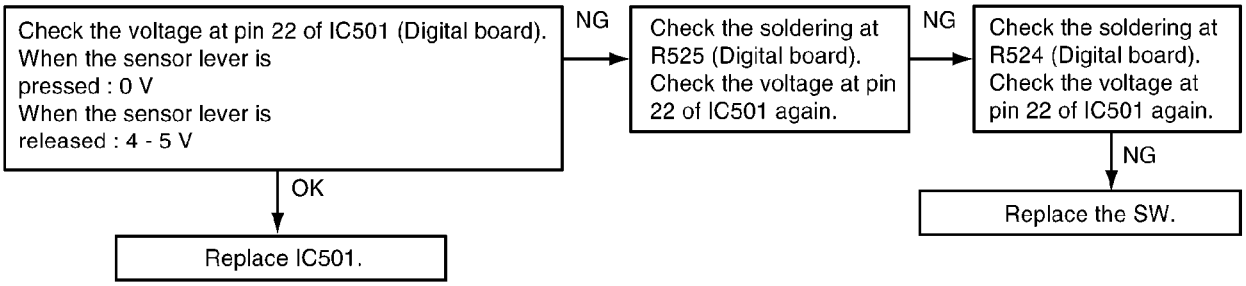
6.7.10.2. Check the Document Set SW (SW352)....."CHECK DOCUMENT"


Check the voltage at pin 15 of IC301(Operation board).
SW lever released: 5 V
(Document)
SW lever pressed: 0 V
(No document)
NG
Check the soldering at R314 (operation board). Check the voltage at pin 15 of IC301 again.
NG
Check the soldering at R315 (operation board). Check the voltage at pin 15 of IC301 again.
NG
Replace SW352.
OK
Replace IC301.

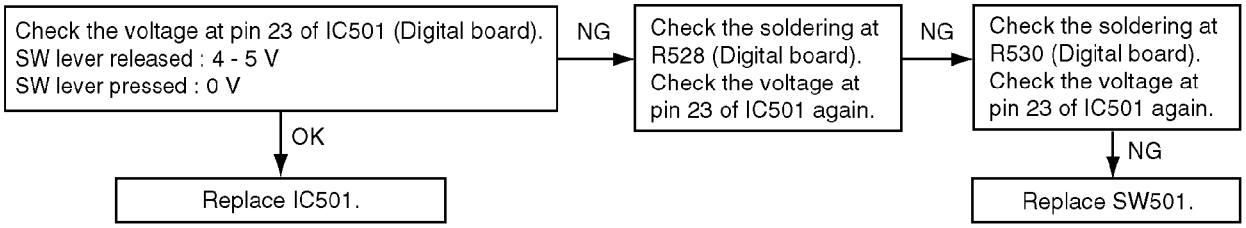
6.7.10.3. Check the Cover Open SW (SW102)....."COVER OPEN"


Check the voltage at pin 64 of IC501(Digital board).
SW lever released: 5 V
(Open)
SW lever pressed: 0 V
(Close)
NG
Check the soldering at R590 (Digital board). Check the voltage at pin 64 of IC501 again.
NG
Check the soldering at R591 (Digital board). Check the voltage at pin 64 of IC501 again.
NG
Replace SW102.
OK
Replace IC501.
Check the voltage at pin 1 of CN510 (Digital board).
SW lever released: 5 V (Open)
SW lever pressed: 0 V (Close)
NG
Check the soldering at RED / WHITE wires on COVER OPEN SW board. Check the voltage at pin 1 of CN510 again.
NG
OK
OK

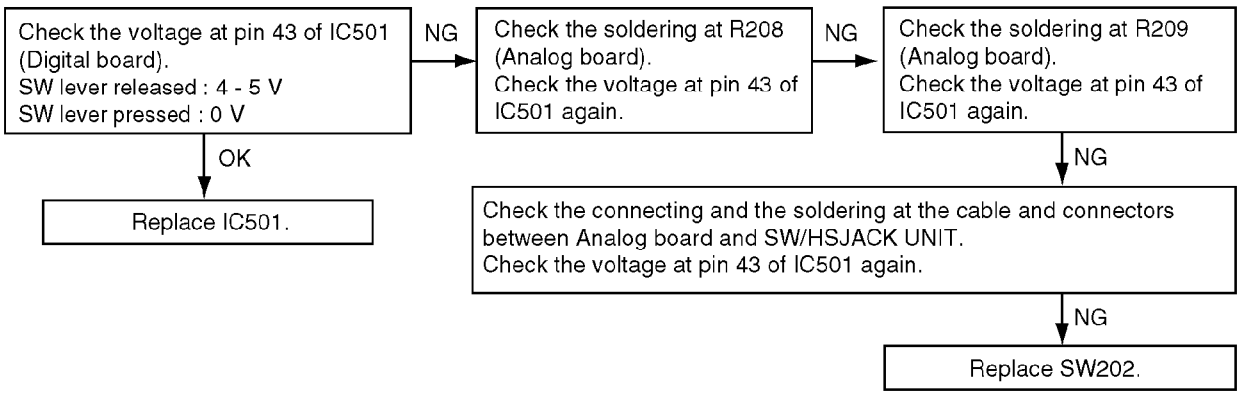
6.7.10.4. Check the Paper Top SW....."PAPER JAMMED"



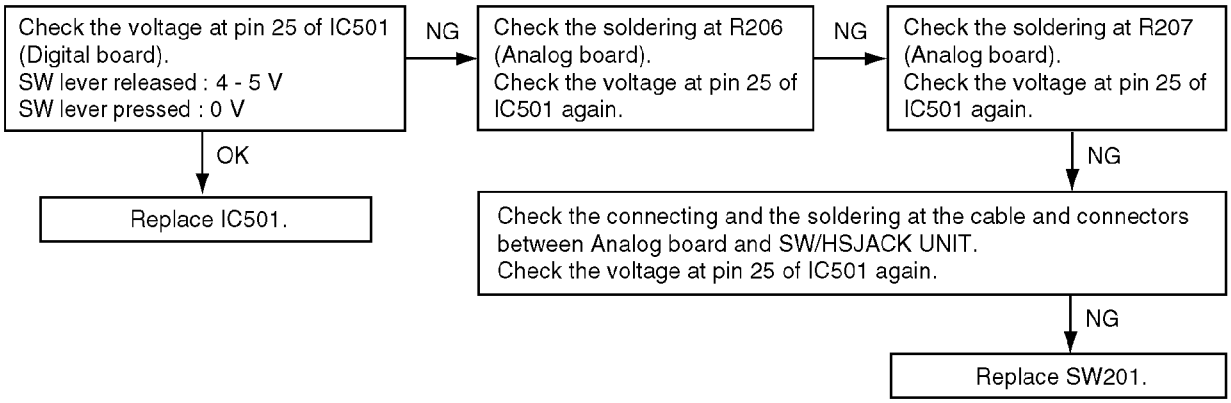
6.7.10.5. Check the Film End SW (SW 501)....."CHECK FILM"



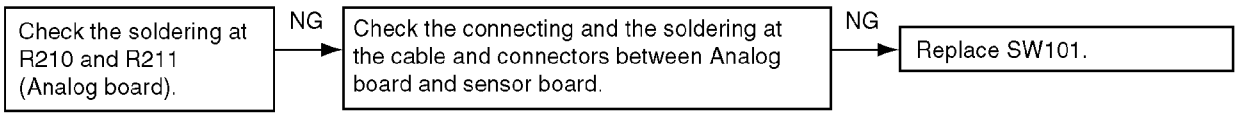
6.7.10.6. Check the Motor Position SW (SW202)


Check the voltage at pin 43 of IC501
(Digital board).
SW lever released : 4 - 5 V
SW lever pressed : 0 V
NG
Check the soldering at R208
(Analog board).
Check the voltage at pin 43 of
IC501 again.
NG
Check the soldering at R209
(Analog board).
Check the voltage at pin 43 of
IC501 again.
NG
Check the connecting and the soldering at the cable and connectors
between Analog board and SW/HSJACK UNIT.
Check the voltage at pin 43 of IC501 again.
NG
Replace SW202.
OK
Replace IC501.

6.7.10.7. Check the HOOK SW (SW201)

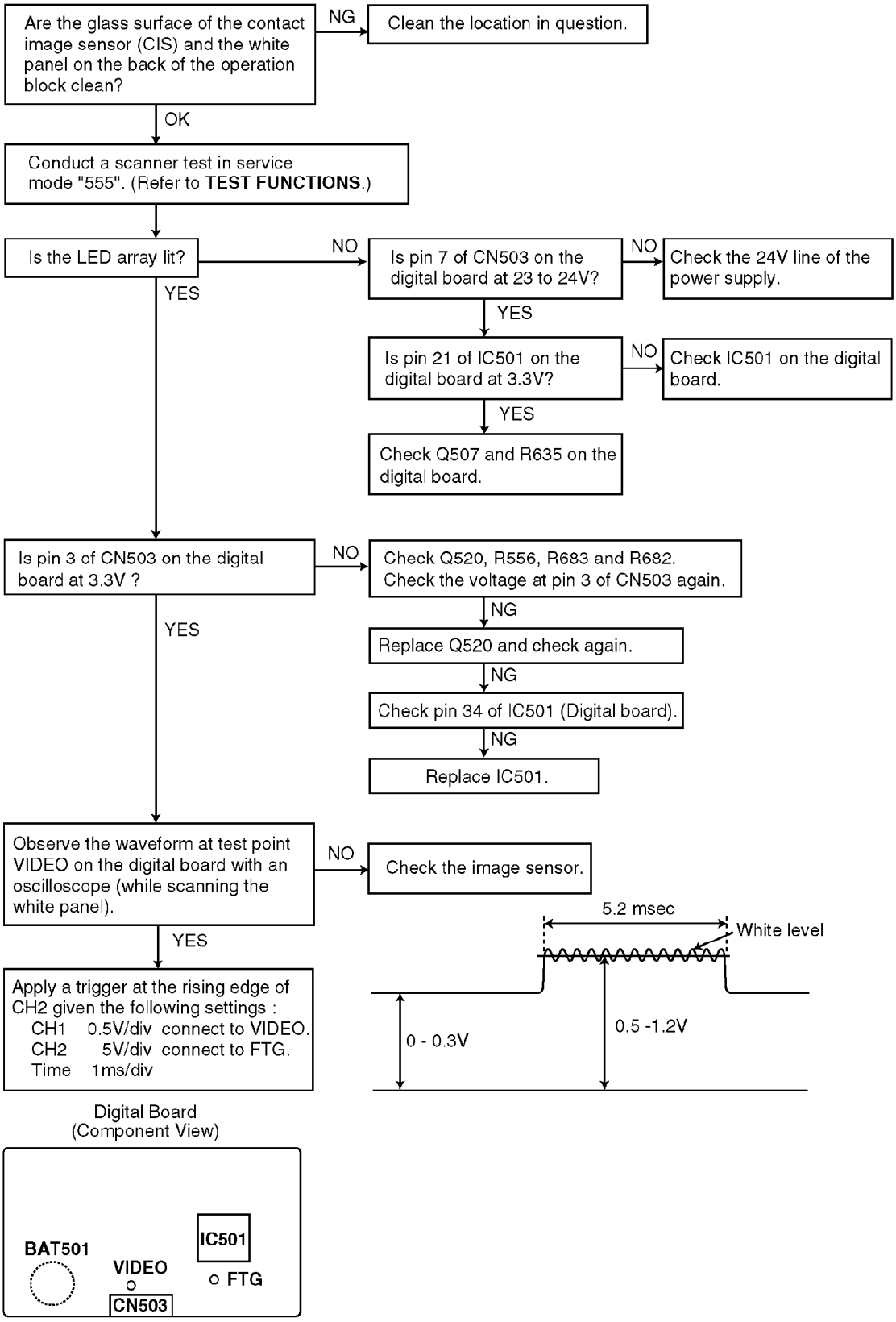

Check the voltage at pin 25 of IC501 (Digital board).
SW lever released : 4 - 5 V
SW lever pressed : 0 V
NG
Check the soldering at R206 (Analog board).
Check the voltage at pin 25 of IC501 again.
NG
Check the soldering at R207 (Analog board).
Check the voltage at pin 25 of IC501 again.
OK
Replace IC501.
NG
Check the connecting and the soldering at the cable and connectors between Analog board and SW/HSJACK UNIT.
Check the voltage at pin 25 of IC501 again.
NG
Replace SW201.

6.7.10.8. Check the FILM SENSOR (SW101)....."CHECK FILM SLACK"


Check the soldering at R210 and R211 (Analog board).
NG
Check the connecting and the soldering at the cable and connectors between Analog board and sensor board.
NG
Replace SW101.

6.7.11. CIS (Contact Image Sensor) SECTION

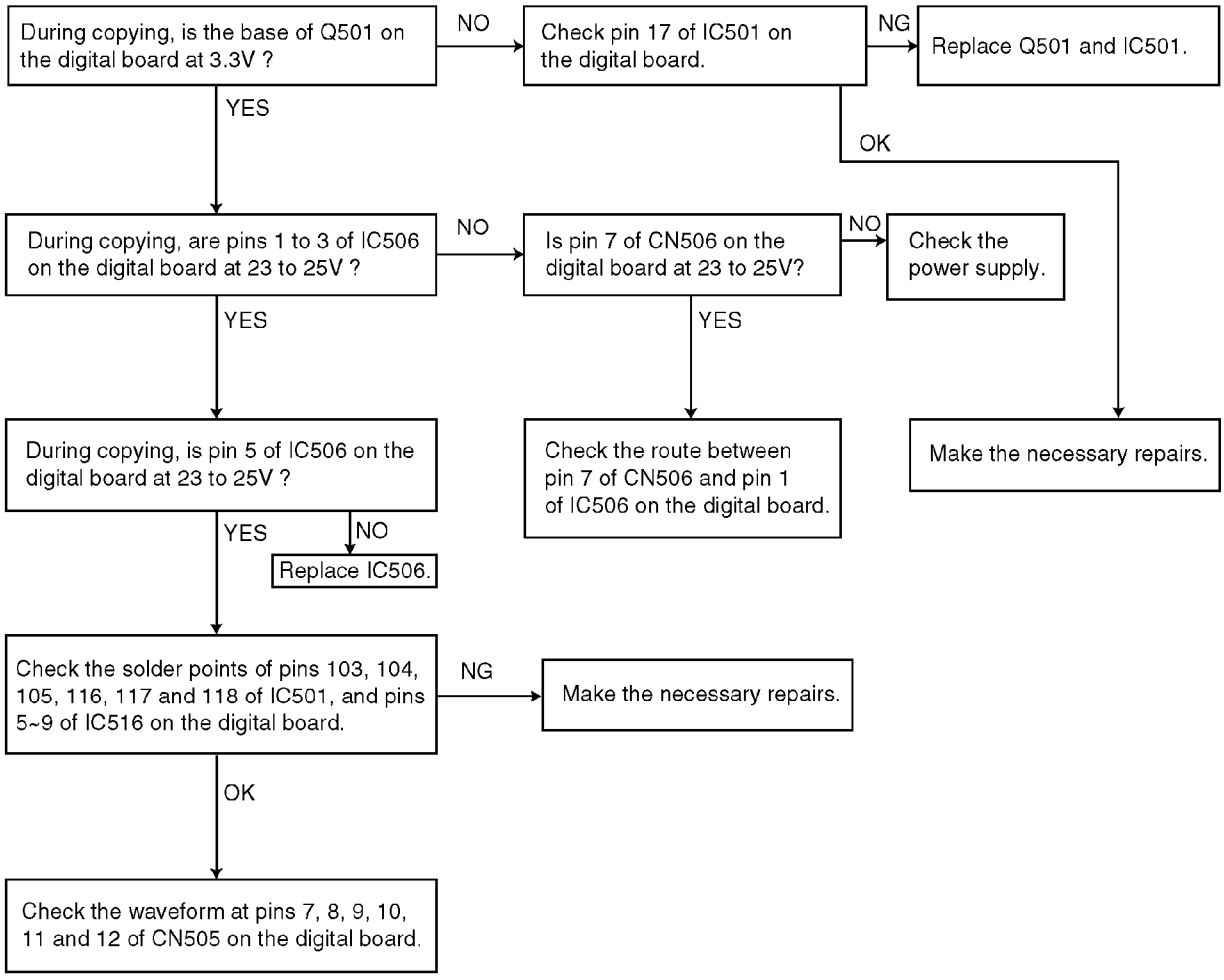
Refer to SCANNING BLOCK( ).


Are the glass surface of the contact image sensor (CIS) and the white panel on the back of the operation block clean?
NG
Clean the location in question.
OK
Conduct a scanner test in service mode "555". (Refer to TEST FUNCTIONS.)
Is the LED array lit?
NO
Is pin 7 of CN503 on the digital board at 23 to 24V?
NO
Check the 24V line of the power supply.
YES
YES
Is pin 21 of IC501 on the digital board at 3.3V?
NO
Check IC501 on the digital board.
YES
Check Q507 and R635 on the digital board.
YES
Is pin 3 of CN503 on the digital board at 3.3V ?
NO
Check Q520, R556, R683 and R682. Check the voltage at pin 3 of CN503 again.
NG
Replace Q520 and check again.
NG
Check pin 34 of IC501 (Digital board).
NG
Replace IC501.
YES
Observe the waveform at test point VIDEO on the digital board with an oscilloscope (while scanning the white panel).
NO
Check the image sensor.
YES
Apply a trigger at the rising edge of CH2 given the following settings :
CH1 0.5V/div connect to VIDEO.
CH2 5V/div connect to FTG.
Time 1ms/div
5.2 msec
White level
0 - 0.3V
0.5 -1.2V
Digital Board
(Component View)
BAT501
VIDEO
CN503
IC501
FTG

CROSS REFERENCE:
TEST FUNCTIONS(
)

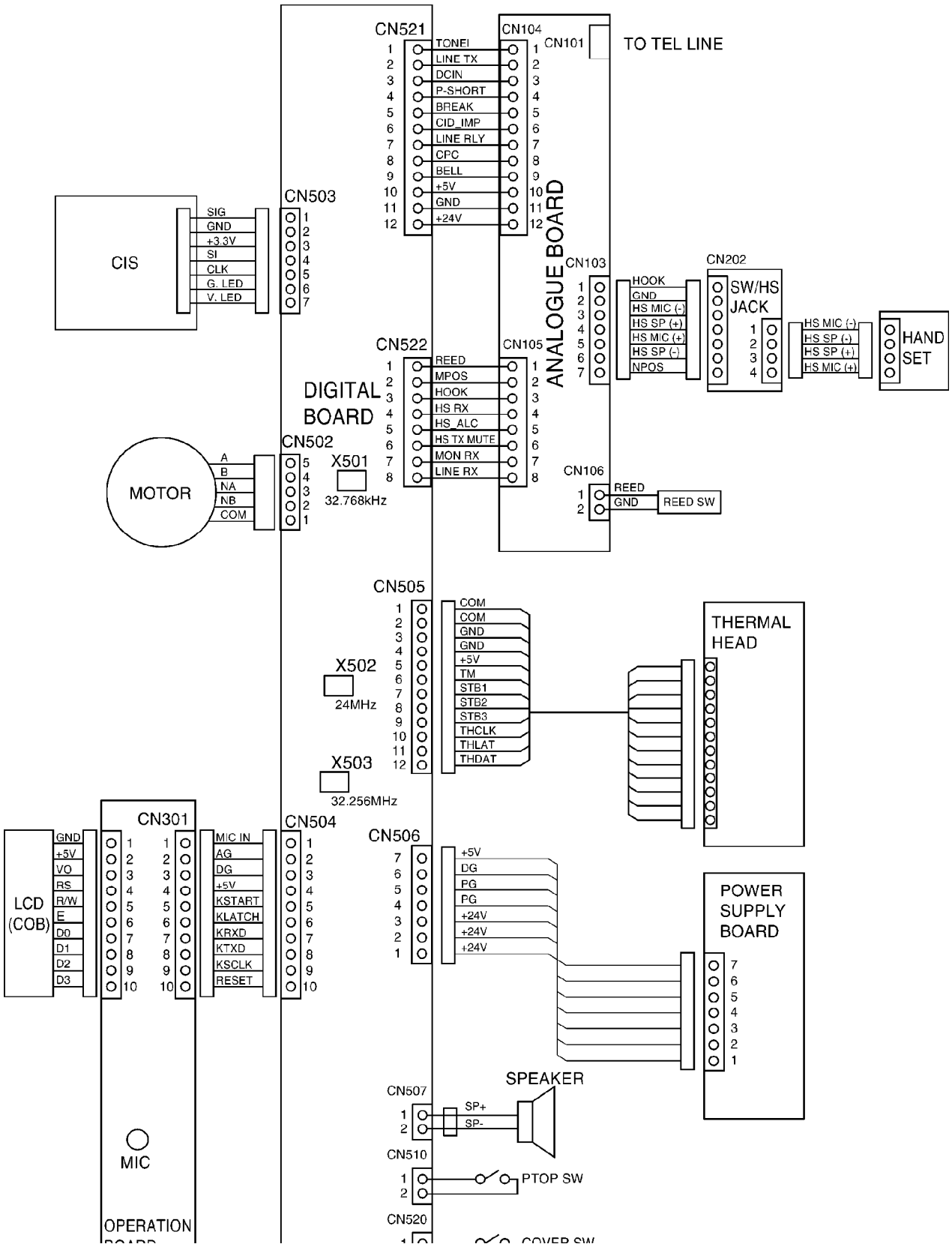
6.7.12. THERMAL HEAD SECTION

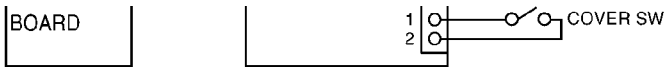
Refer to THERMAL HEAD(
).


During copying, is the base of Q501 on the digital board at 3.3V ?
NO
Check pin 17 of IC501 on the digital board.
NG
Replace Q501 and IC501.
YES
OK
During copying, are pins 1 to 3 of IC506 on the digital board at 23 to 25V ?
NO
Is pin 7 of CN506 on the digital board at 23 to 25V?
NO
Check the power supply.
YES
YES
During copying, is pin 5 of IC506 on the digital board at 23 to 25V ?
Check the route between pin 7 of CN506 and pin 1 of IC506 on the digital board.
Make the necessary repairs.
YES
NO
Replace IC506.
Check the solder points of pins 103, 104, 105, 116, 117 and 118 of IC501, and pins 5~9 of IC516 on the digital board.
NG
Make the necessary repairs.
OK
Check the waveform at pins 7, 8, 9, 10, 11 and 12 of CN505 on the digital board.

7. CIRCUIT OPERATIONS

7.1. CONNECTION DIAGRAM


CN521
CN104
CN101
TO TEL LINE
TONE
LINE TX
DCIN
P-SHORT
BREAK
CID_IMP
LINE RLY
CPC
BELL
+5V
GND
+24V
CN503
SIG
GND
+3.3V
SI
CLK
G. LED
V. LED
CIS
ANALOGUE BOARD
CN103
HOOK
GND
HS MIC (-)
HS SP (+)
HS MIC (+)
HS SP (-)
NPOS
CN202
SW/HS JACK
HS MIC (-)
HS SP (-)
HS SP (+)
HS MIC (+)
HAND SET
CN522
CN105
REED
MPOS
HOOK
HS RX
HS_ALC
HS TX MUTE
MON RX
LINE RX
DIGITAL BOARD
CN502
X501
32.768kHz
MOTOR
A
B
NA
NB
COM
CN106
REED
GND
REED SW
CN505
X502
24MHz
X503
32.256MHz
COM
COM
GND
GND
+5V
TM
STB1
STB2
STB3
THCLK
THLAT
THDAT
THERMAL HEAD
CN301
CN504
CN506
LCD (COB)
GND
+5V
VO
RS
R/W
E
D0
D1
D2
D3
MIC IN
AG
DG
+5V
KSTART
KLATCH
KRXD
KTXD
KSCLK
RESET
+5V
DG
PG
PG
+24V
+24V
+24V
POWER SUPPLY BOARD
SPEAKER
CN507
SP+
SP-
CN510
PTOP SW
CN520
MIC
OPERATION



7.2. GENERAL BLOCK DIAGRAM

The following is an outline of each device IC on the digital board. (Refer to GENERAL BLOCK DIAGRAM( ).).

1. ASIC (IC501)
Composed mainly of an address decoder and a modem control.
Controls the general FAX operations.
Controls the operation panel I/F.
Controls the thermal head I/F and CIS I/F.
Performs the image processing.
CPU and Real time clock
Provides the reset pulse for each of the major ICs.

2. Flash ROM (IC502)
Contains all of the program instructions on the unit operations.
This memory is used mainly for the parameter working in the storage area.

3. Dynamic RAM (IC503)
This memory is used mainly for the parameter working in the storage area.

4. MODEM (IC505)
Performs the modulation and the demodulation for FAX communication.

5. Read Section
CIS image sensor to read transmitted documents.

6. Motor Driver (IC508)
Drives the transmission motor and the reception motor.

7. Thermal Head
Contains heat-emitting elements for dot matrix image printing.

8. Analogue Board
Composed of ITS circuit and NCU circuit.

9. Sensor Section
Composed of a cover open and film end switch, a document set switch, a document top switch, a paper top sensor and a motor position switch.

10. Power Supply Board Switching Section

Supplies +5V and +24V to the unit.

11. Flash Memory (IC512)

This memory is used for voice prompt and TAM.

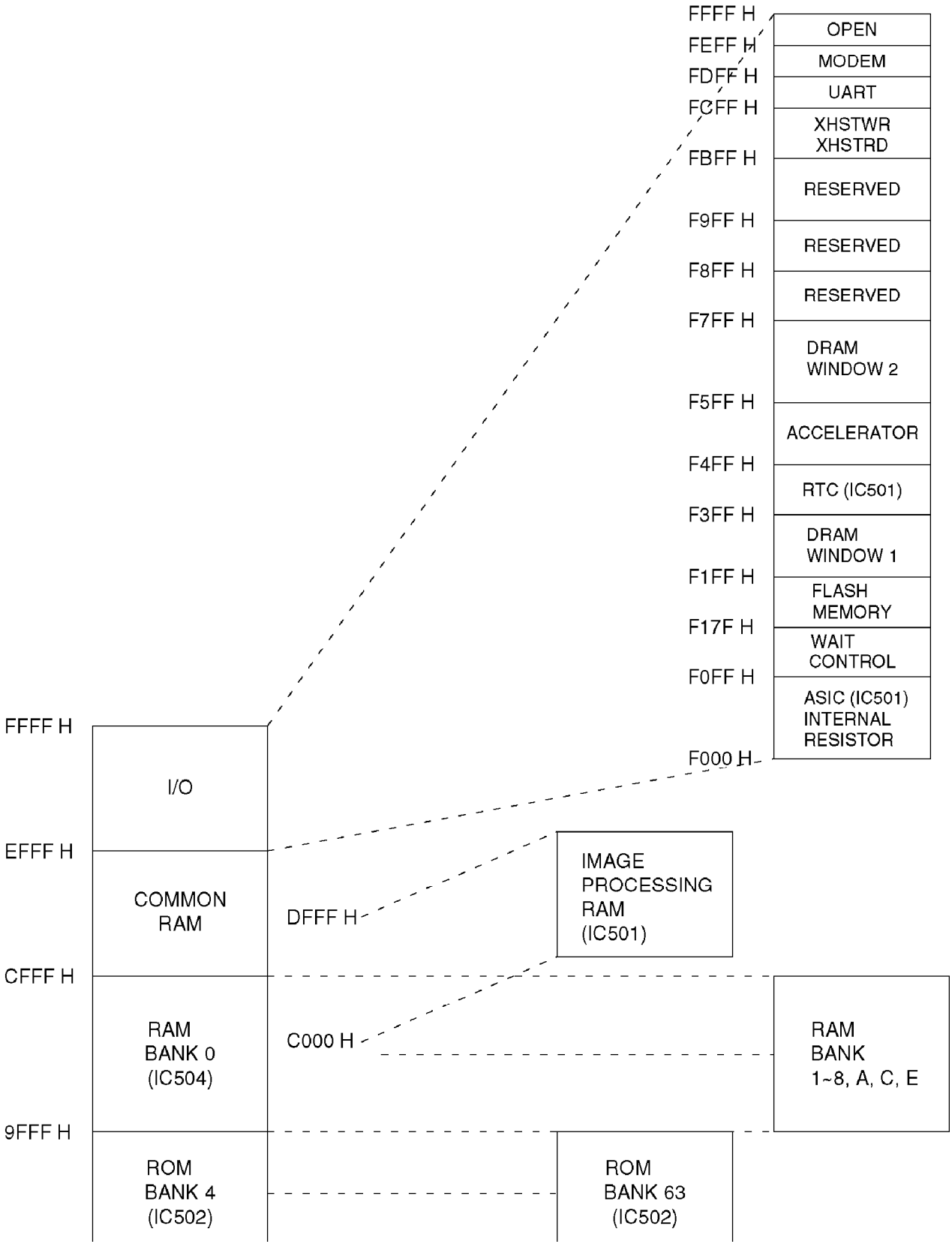
7.2.1. GENERAL BLOCK DIAGRAM

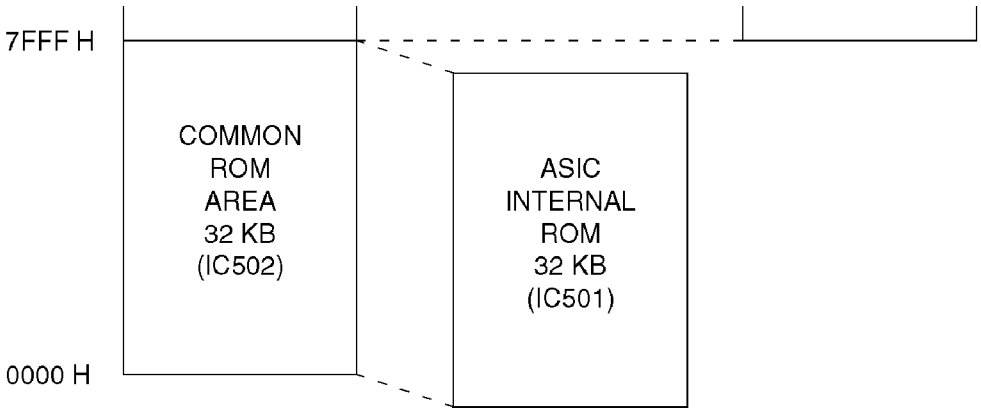
CROSS REFERENCE:
ANALOGUE UNIT BLOCK DIAGRAM(
)

7.3. CONTROL SECTION

7.3.1. BLOCK DIAGRAM

7.3.2. MEMORY MAP


FFFF H
FEFF H
FDFF H
FCFF H
FBFF H
F9FF H
F8FF H
F7FF H
F5FF H
F4FF H
F3FF H
F1FF H
F17F H
F0FF H
F000 H
OPEN
MODEM
UART
XHSTWR
XHSTRD
RESERVED
RESERVED
RESERVED
DRAM
WINDOW 2
ACCELERATOR
RTC (IC501)
DRAM
WINDOW 1
FLASH
MEMORY
WAIT
CONTROL
ASIC (IC501)
INTERNAL
RESISTOR
FFFF H
I/O
EFFF H
COMMON
RAM
DFFF H
IMAGE
PROCESSING
RAM
(IC501)
CFFF H
RAM
BANK 0
(IC504)
C000 H
RAM
BANK
1~8, A, C, E
9FFF H
ROM
BANK 4
(IC502)
ROM
BANK 63
(IC502)



7.3.3. ASIC (IC501)

This custom IC is used for the general FAX operations.

1. CPU:
This model uses a Z80 equivalent to the CPU operating at 12 MHz. Most of the peripheral functions are performed by custom-designed LSIs. Therefore, the CPU only works for processing the results.

2. RTC:
Real Time Clock

3. DECODER:
Decodes the address.

4. ROM/RAM I/F:
Controls the SELECT signal of ROM or RAM and the bank switching.

5. CIS I/F:
Controls the document reading.

6. IMAGE DATA RAM:
This memory is programmed into the ASIC and uses 8 KB for the image processing. (See Fig. A.*)

7. THERMAL HEAD I/F:
Transmits the recorded data to the thermal head.

8. MOTOR I/F:
Controls the transmission motor which feeds the document.
Controls the receiving motor which feeds the recording paper.

9. OPERATION PANEL I/F:
Serial interface with Operation Panel.

10. I/O PORT:

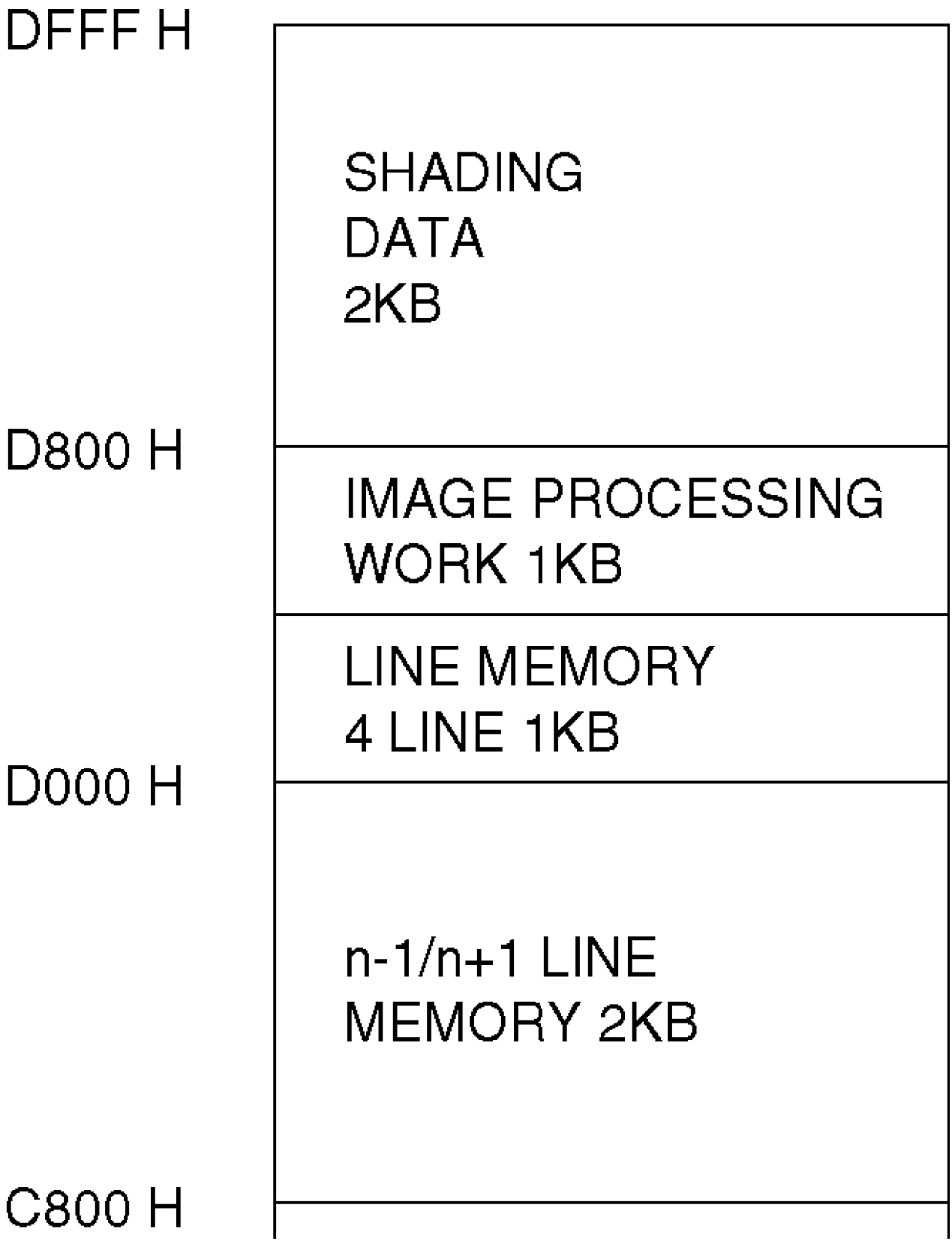
I/O Port Interface.

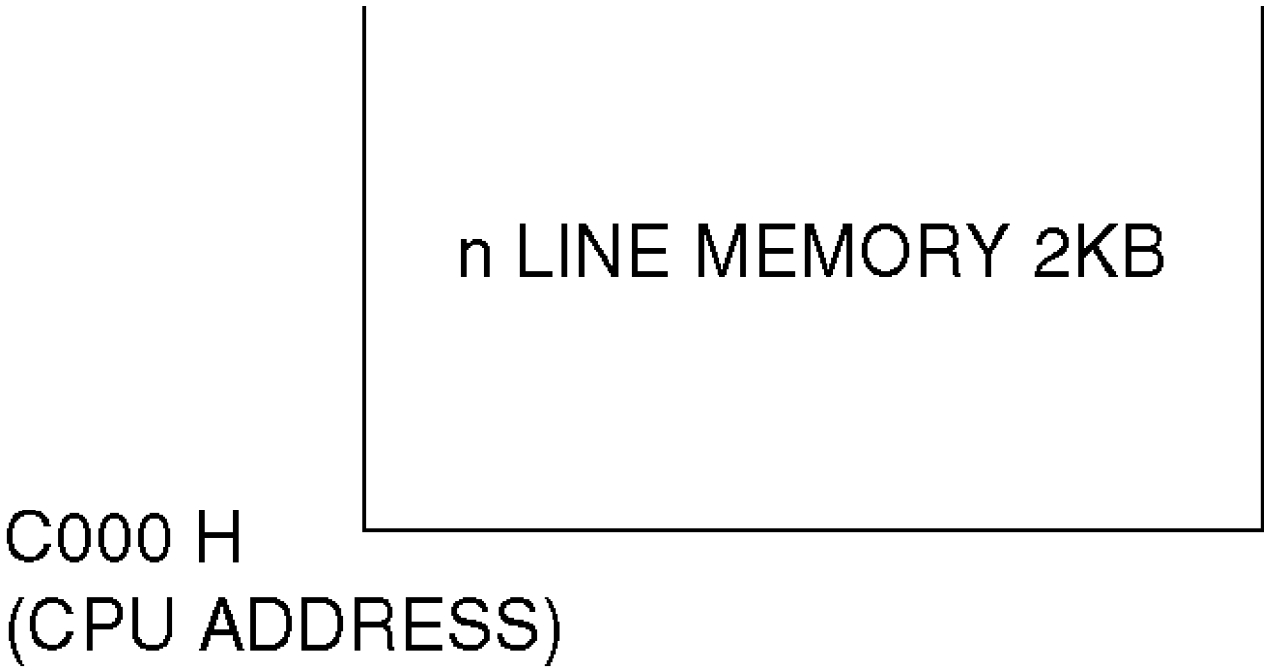
11. ANALOGUE UNIT:

Electronic volume for the monitor.

Sends beep tones, etc.

Fig. A


DFFF H
SHADING
DATA
2KB
D800 H
IMAGE PROCESSING
WORK 1KB
LINE MEMORY
4 LINE 1KB
D000 H
n-1/n+1 LINE
MEMORY 2KB
C800 H



Note*:
This memory is incorporated into the ASIC (IC501) and used for the image processing.
Fig. A shows the memory map of the Image Data RAM.

7.3.4. FLASH MEMORY (IC502)

This 512KB ROM (FLASH MEMORY) carries a common area of 32KB and bank areas which each have 8KB (BK4~BK63). The addresses from 0000H to 7FFFH are for the common area and from 8000H to 9FFFH are for the bank areas.

7.3.5. DYNAMIC RAM (IC503)

The DRAM serves as CPU and receives memory.
The address is F200H~F3FFH (DRAM access window 1) and F600H~F7FFH (DRAM access window 2).

Descriptions of Pin Distribution (IC501)

NO.	SIGNAL	I/O	POWER SUPPLIED VOLTAGE	DESCRIPTION
1	VSSA		GND	POWER SOURCE (ANALOG GND)
2	VDDA 3.3		3.3V	POWER SOURCE (ANALOG +3.3V)
3	AIN1	A	3.3V	CIS IMAGE SIGNAL INPUT (SIG)
4	AIN2	A	3.3V	THERMISTOR TEMPERATURE WATCH INPUT
5	AIN3	A	3.3V	LINE VOLTAGE DETECTION SIGNAL INPUT (DCIN)
6	AMON	A	3.3V	ANALOG SIGNAL MONITOR TERMINAL
7	VSS		GND	POWER SOURCE (GND)
8	X32OUT	O	3.3V/BATT	RTC (32.768KHz) CONNECTION
9	X32IN	I	3.3V/BATT	RTC (32.768KHz) CONNECTION
10	VDD (3.3V / B)		-----	POWER SOURCE (+3.3V/LITHIUM BATTERY)
11	XBACEN	I	3.3V/BATT	BACKUP ENABLE
12	XRAMCS	O	3.3V/BATT	NOT USED
13	VDD (3.3V / B)		-----	POWER SOURCE(+3.3V / LITHIUM BATTERY)
14	VDD (2.5V/B)		-----	POWER SOURCE (+2.5V / LITHIUM BATTERY)
15	FTG	O	3.3V	SH SIGNAL OUTPUT FOR CIS (SI)
16	F1	O	3.3V	01 SIGNAL OUTPUT FOR CIS (CLK)
17	F2/OP	O	3.3V	OUTPUT PORT (THON)
18	FR/OP	O	3.3V	OUTPUT PORT (MDMRST)
19	CPC	I	3.3V	INPUT PORT (CPC)
20	RVN	I	3.3V	INPUT PORT (REED)
21	IRDATXD/IOP	O	3.3V	OUTPUT PORT (CISLED)
22	IRDARXD/IOP80	I	3.3V	INPUT PORT (PTOP)
23	TXD/IOP	I	3.3V	INPUT PORT (FILMEND)
24	RXD/IOP	O	3.3V	OUTPUT PORT (HS-ALC)
25	XRTS/IOP	I	3.3V	INPUT PORT (HOOK)
26	XCTS/IOP	O	3.3V	OUTPUT PORT (SPMUTE)
27	VDD (2.5V)		-----	POWER SOURCE (+2.5V)
28	TONE1	A	3.3V	TONE OUTPUT
29	TONE2	A	3.3V	TONE OUTPUT
30	VOLUREF	A	3.3V	ANALOG REF VOLTAGE
31	VOLUOUT	A	3.3V	VOLUME OUTPUT
32	VOLUIN	A	3.3V	VOLUME INPUT
33	XNMI	I	3.3V	HIGH FIXED

NO.	SIGNAL	I/O	POWER SUPPLIED VOLTAGE	DESCRIPTION
34	FMEMDO/IOP	O	3.3V	OUTPUT PORT (CIS ON)
35	VDD (3.3V)		-----	POWER SOURCE (+3.3V)
36	VSS		GND	POWER SOURCE (GND)
37	VSS		GND	POWER SOURCE (GND)
38	VDD (3.3V)		-----	POWER SOURCE (+3.3V)
39	MIDAT/IOP	O	3.3V	PORT (DATA)
40	MICLK/IOP	O	3.3V	PORT (DR)
41	MILAT/IOP	O	3.3V	PORT (CD)
42	20KOSC/IOP	I/O	3.3V	PORT (TONEIEN)
43	XWAIT	I	3.3V	INPUT PORT (MPOS)
44	HSTRD/IOP	O	3.3V	OUTPUT (DCLK)
45	HSTWR/IOP	O	3.3V	OUTPUT PORT (XHSTWR)
46	XOPRBE	O	3.3V	MFCS
47	ADR15	O	3.3V	CPU ADDRESS BUS 15 (NOT USED)
48	ADR14	O	3.3V	CPU ADDRESS BUS 14 (NOT USED)
49	ADR13	O	3.3V	CPU ADDRESS BUS 13 (NOT USED)
50	VDD (2.5V)		-----	POWER SOURCE (+2.5V)
51	XOUT	O	3.3V	SYSTEM CLOCK (24MHz)
52	XIN	I	3.3V	SYSTEM CLOCK (24MHz)
53	VSS		GND	POWER SOURCE (GND)
54	VDD (3.3V)		-----	POWER SOURCE (+3.3V)
55	XTEST	O	3.3V	24MHz CLOCK
56	TEST1	I	3.3V	HIGH FIXED
57	TEST2	I	3.3V	HIGH FIXED
58	TEST3	I	3.3V	HIGH FIXED
59	TEST4	I	3.3V	HIGH FIXED
60	XMDMINT	I	3.3V	MODEM INTERRUPT
61	XMDMCS	O	3.3V	MODEM CHIP SELECT
62	XRAS/IOP	O	3.3V	DRAM (IC503) ROW ADDRESS STROBE
63	XCAS1/IOP	O	3.3V	DRAM (IC503) CULUM ADDRESS STROBE
64	XCAS2/IOP	I	3.3V	INPUT PORT (COVER)
65	XRESCS2	O	3.3V	FLASH CHIP SELECT (XRESCS2)
66	DB3	I/O	3.3V	CPU DATA BUS 3
67	DB2	I/O	3.3V	CPU DATA BUS 2
68	DB4	I/O	3.3V	CPU DATA BUS 4
69	DB1	I/O	3.3V	CPU DATA BUS 1
70	DB5	I/O	3.3V	CPU DATA BUS 5
71	VDD (3.3V)		-----	POWER SOURCE (+3.3V)

NO.	SIGNAL	I/O	POWER SUPPLIED VOLTAGE	DESCRIPTION
72	VSS		GND	POWER SOURCE (GND)
73	VSS		GND	POWER SOURCE (GND)
74	VDD (3.3V)		-----	POWER SOURCE (+3.3V)
75	DB0	I/O	3.3V	CPU DATA BUS 0
76	DB6	I/O	3.3V	CPU DATA BUS 6
77	DB7	I/O	3.3V	CPU DATA BUS 7
78	XROMCS	O	3.3V	ROM (IC502) CHIP SELECT
79	RD	O	3.3V	CPU RD
80	WR	O	3.3V	CPU WR
81	ADR0	O	3.3V	CPU ADDRESS BUS 0
82	ADR1	O	3.3V	CPU ADDRESS BUS 1
83	ADR2	O	3.3V	CPU ADDRESS BUS 2
84	ADR3	O	3.3V	CPU ADDRESS BUS 3
85	ADR4	O	3.3V	CPU ADDRESS BUS 4
86	ADR5	O	3.3V	CPU ADDRESS BUS 5
87	VSS		GND	POWER SOURCE (GND)
88	VDD (2.5V)		-----	POWER SOURCE (+2.5V)
89	ADR6	O	3.3V	CPU ADDRESS BUS 6
90	ADR7	O	3.3V	CPU ADDRESS BUS 7
91	ADR8	O	3.3V	CPU ADDRESS BUS 8
92	ADR9	O	3.3V	CPU ADDRESS 9
93	ADR10	O	3.3V	CPU ADDRESS 10
94	ADR11	O	3.3V	CPU ADDRESS 11
95	ADR12	O	3.3V	CPU ADDRESS 12
96	RBA0	O	3.3V	ROM/RAM BANK ADDRESS 0
97	RBA1	O	3.3V	ROM/RAM BANK ADDRESS 1
98	RBA2	O	3.3V	ROM/RAM BANK ADDRESS 2
99	RBA3	O	3.3V	ROM/RAM BANK ADDRESS 3
100	RBA4	O	3.3V	ROM/RAM BANK ADDRESS 4
101	RBA5	O	3.3V	ROM/RAM BANK ADDRESS 5
102	RBA6/IOP96	O	3.3V	A19
103	STB1	O	3.3V	STROBE SIGNAL OUTPUT TO THERMAL HEAD
104	STB2	O	3.3V	STROBE SIGNAL OUTPUT TO THERMAL HEAD
105	STB3	O	3.3V	STROBE SIGNAL OUTPUT TO THERMAL HEAD
106	XRESET	I	3.3V	RESET INPUT

NO.	SIGNAL	I/O	POWER SUPPLIED VOLTAGE	DESCRIPTION
107	VDD (3.3V)		-----	POWER SOURCE (+3.3V)
108	VSS		GND	POWER SOURCE (GND)
109	VSS		GND	POWER SOURCE (GND)
110	VDD (3.3V)		-----	POWER SOURCE (+3.3V)
111	XORESET	O	3.3V	NOT USED
112	VDD(5V)		-----	POWER SOURCE (+5V)
113	VSS		GND	POWER SOURCE (GND)
114	XRESETI	I	3.3V	RESET INPUT
115	WDERR	O	3.3V	WATCHED ERROR OUTPUT SIGNAL
116	THDAT	O	3.3V	RECORDED IMAGE OUTPUT (XTHDAT)
117	THCLK	O	3.3V	CLOCK OUTPUT FOR DATA TRANSFER (XTHCLK)
118	THLAT	O	3.3V	PULSE OUTPUT FOR DATA LATCH (XTHLAT)
119	STBNP	I	3.3V	INPUT PORT (TEST)
120	RM0/IOP	O	3.3V	OUTPUT PORT (OPRESET)
121	RM1/IOP	I/O	3.3V	(TEL RXEN)
122	RM2/IOP	I/O	3.3V	(HS RXEN)
123	RM3/IOP	I/O	3.3V	MDMTXEN
124	RXE/IOP	I	3.3V	INPUT PORT (BELL)
125	TMO	O	3.3V	MOTOR A PHASE
126	VDD (2.5V)		-----	POWER SOURCE (+2.5V)
127	VSS		GND	POWER SOURCE (GND)
128	TM1/IOP	O	3.3V	MOTOR B PHASE
129	TM2/IOP	O	3.3V	MOTOR /A PHASE
130	TM3/IOP	O	3.3V	MOTOR /B PHASE
131	TXE/IOP	O	3.3V	MOTOR ENABLE SIGNAL
132	KSTART	O	3.3V	OPERATION PANEL CONTROL
133	KLATCH	O	3.3V	OPERATION PANEL CONTROL
134	KSCLK	O	3.3V	OPERATION PANEL CONTROL
135	KTXD	O	3.3V	OPERATION PANEL CONTROL
136	KRXD	I	3.3V	OPERATION PANEL CONTROL
137	FMEMCLK/IOP	O	3.3V	OUTPUT PORT (BREAK)
138	FMEMDI/IOP	O	3.3V	OUTPUT PORT (DR)
139	ADSEL1	O	3.3V	CHANNEL SELECT SIGNAL FOR AIN2
140	VDDA (2.5V)		2.5V	POWER SOURCE (ANALOG +2.5V)
141	VREFB	A	3.3V	A/D CONVERTER'S ZERO STANDARD VOLTAGE OUTPUT

NO.	SIGNAL	I/O	POWER SUPPLIED VOLTAGE	DESCRIPTION
142	VCL	A	3.3V	ANALOG PART STANDARD VOLTAGE SIGNAL
143	VREFT	A	3.3V	A/D CONVERTER'S FULL SCALE VOLTAGE OUTPUT
144	VSSA		GND	POWER SOURCE (ANALOG GND)

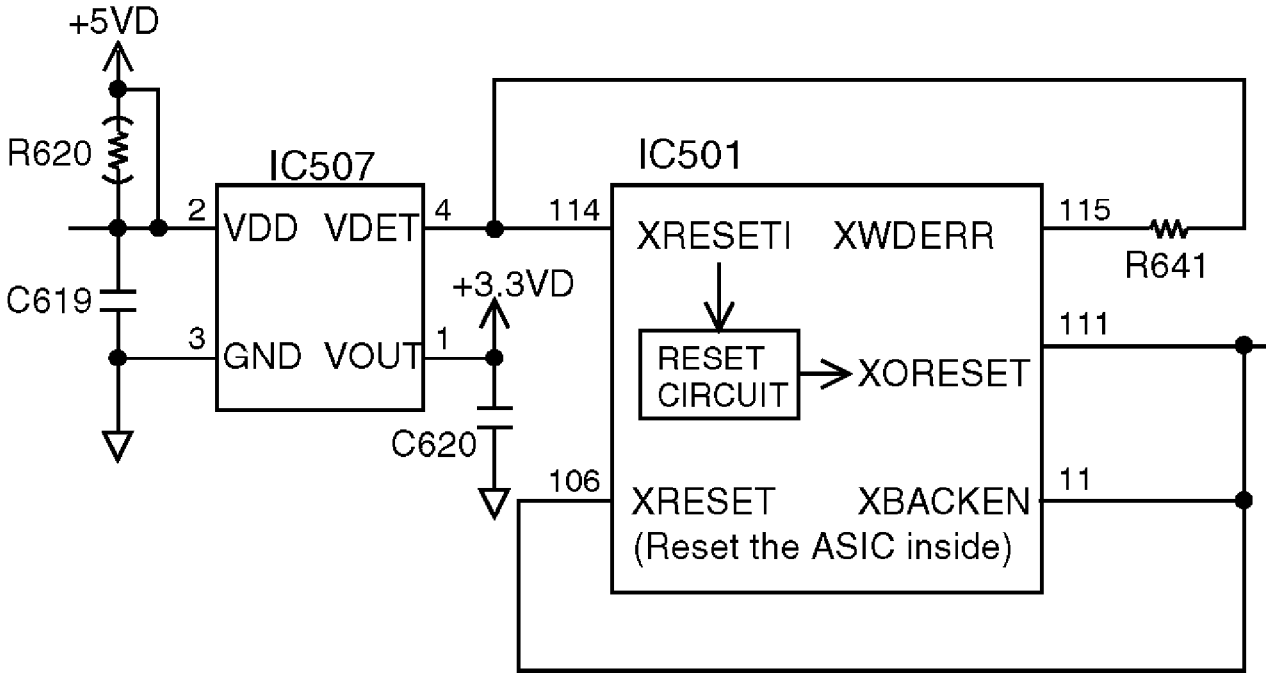
IC519

NO.	SIGNAL	I/O	POWER SUPPLIED VOLTAGE	DESCRIPTION
2	CID_IMP	O	3.3V	Impedance control for Caller ID
5	P_SHORT	O	3.3V	Pulse short control
9	HSTXMUTE	O	3.3V	Handset Tx signal MUTE control
12	TONE2EN	O	3.3V	Tone2 signal control
15	LINE RLY	O	3.3V	Line RLY (RL101) control

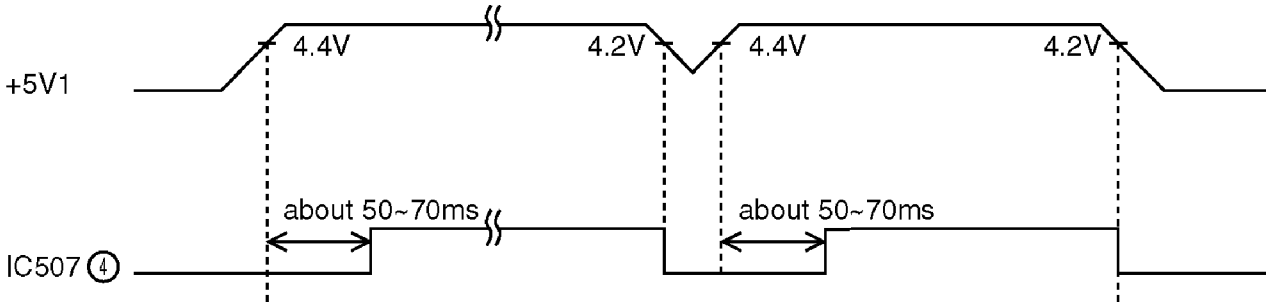
7.3.6. RESET CIRCUIT (WATCH DOG TIMER)

The output signal (reset) from pin 4 of the voltage detect IC (IC507) is input to the ASIC (IC501) 114 pin.

Circuit Diagram



1. During a momentary power interruption, a positive reset pulse of 50~70 msec is generated and the system is reset completely.



2. The watch dog timer, built-in the ASIC (IC501), is initialized by the CPU about every 1.5 ms.
When a watch dog error occurs, pin 115 of the ASIC (IC501) becomes low level. The terminal of the 'WDERR' signal is connected to the reset line, so the 'WDERR' signal works as the reset signal.

7.3.7. RTC BACKUP CIRCUIT

1. Function
This unit has a lithium battery (BAT501) which works for Real Time Clock IC (RTC

: inside IC501).

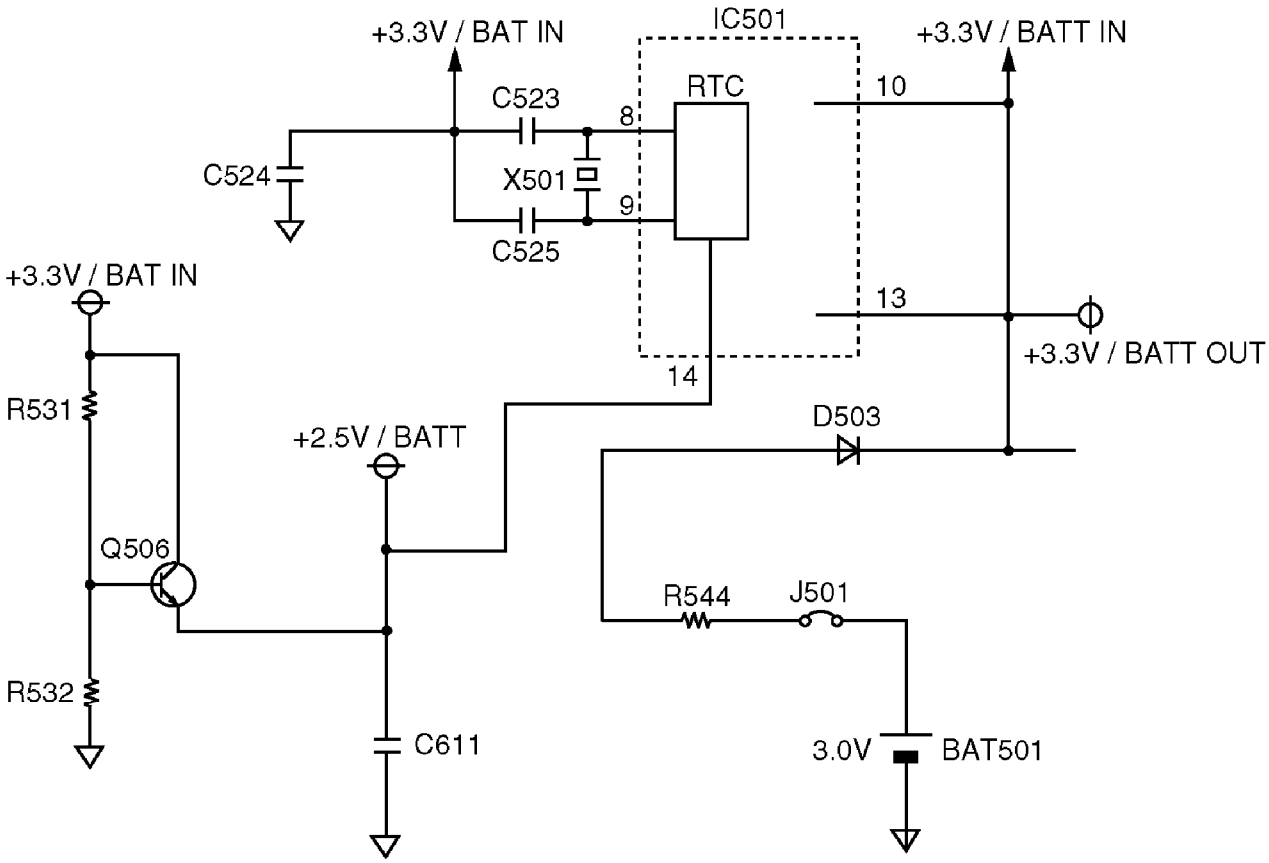
The RTC continues to work, backed up by a lithium battery even when the power switch is OFF.

The user parameters for autodial numbers, the system setup data and others are in the FLASH MEMORY (IC502).

2. RTC Inside (IC501) Backup Circuit Operation

When the power switch is turned ON, power is supplied through Q506 to the RTC (inside IC501). At this time, the voltage at pin 14 of the IC501 is +2.5V. When the power switch is turned OFF, the BAT501 supplies power to RTC through D503 and Q506. The voltage at pin 14 of IC501 is about +2.2V. When the power switch is OFF and the voltage of +3.3V decreases, pin 14 of RTC (IC501) becomes roughly the same voltage as the battery voltage. RTC goes into the backup mode, in which the power consumption is lower.

Circuit Diagram



7.3.8. MODEM CIRCUIT OPERATION

The modem (IC505) has all the hardware satisfying the CCITT standards mentioned previously.
When the ASIC IC501 (61) is brought to a low level, the modem (IC505) is chip-selected and the resistors inside IC are selected by the select signals from ASIC (IC501) ADR0-ADR4. The commands are written through the data bus, and all the processing is controlled by the ASIC (IC501) according to CCITT procedures. The INT signal dispatched from IRQ1, 2 (pins 108 and 121 of IC505) to ASIC (IC501) when the transmission data is accepted and the received data is demodulated, the ASIC (IC501) implements post processing. This modem (IC505) has an automatic application equalizer.
With training signal 1 or 2 during G3 reception, it can automatically establish the optimum equalizer. The modem (IC505) operates using the 32.256 MHz clock (X503).

1. Facsimile Transmission

The digital image data on the data bus is modulated in the modem (IC505), and sent from pin 69 via Analogue SW IC509, amplifier IC102 and the NCU section to the telephone line.

Refer to Check Sheet for Signal Route( ).

2. Facsimile Reception

The analogue image data which is received from the telephone line passes through the NCU section and enters pin 60 of the modem (IC505). The signals that enter pin 60 of the modem (IC505) are demodulated in the board to digital image signals, then placed on the data bus.
In this case, the image signals from the telephone line are transmitted serially. Hence, they are placed on the bus in 8 bit units. Here, the internal equalizer circuit reduces the image signals to a long-distance receiving level.
This is designed to correct the characteristics of the frequency band centered about 3 kHz and maintain a constant receiving sensitivity. It can be set in the service mode.

Refer to Check Sheet for Signal Route( ).

3. DTMF Transmission (Monitor tone)

The DTMF signal generated in the modem (IC505) is output from pin 69, and is then sent to the circuit on the same route as used for facsimile transmission.

Refer to Check Sheet for Signal Route( ).

(DTMF Monitor Tone)

Refer to Check Sheet for Signal Route(

).

4. Call Tone Transmission

This is the call signal which is generated in the ASIC (IC501) and sent to the speaker.

Refer to Check Sheet for Signal Route(
).

5. Busy/Dial Tone Detection

The path is the same as FAX receiving. When it is detected, the carrier detect bit of the resistor in the modem (IC505) becomes 1, and this status is monitored by the ASIC (IC501).

6. Caller ID Detection

The caller ID signal which is received from the telephone line/passes through IC101 pin (6-7). And it enters pin 62 of the modem (IC505).

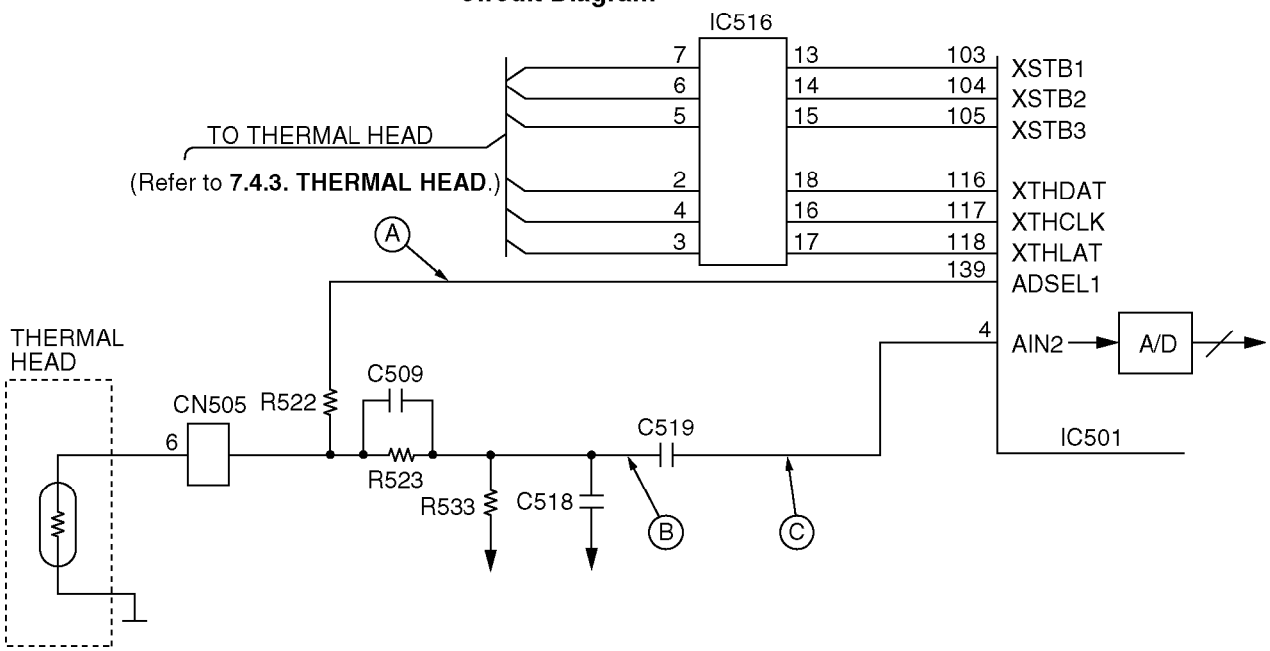
7.3.9. SUPERVISION CIRCUIT FOR THE THERMAL HEAD TEMPERATURE

1. Function

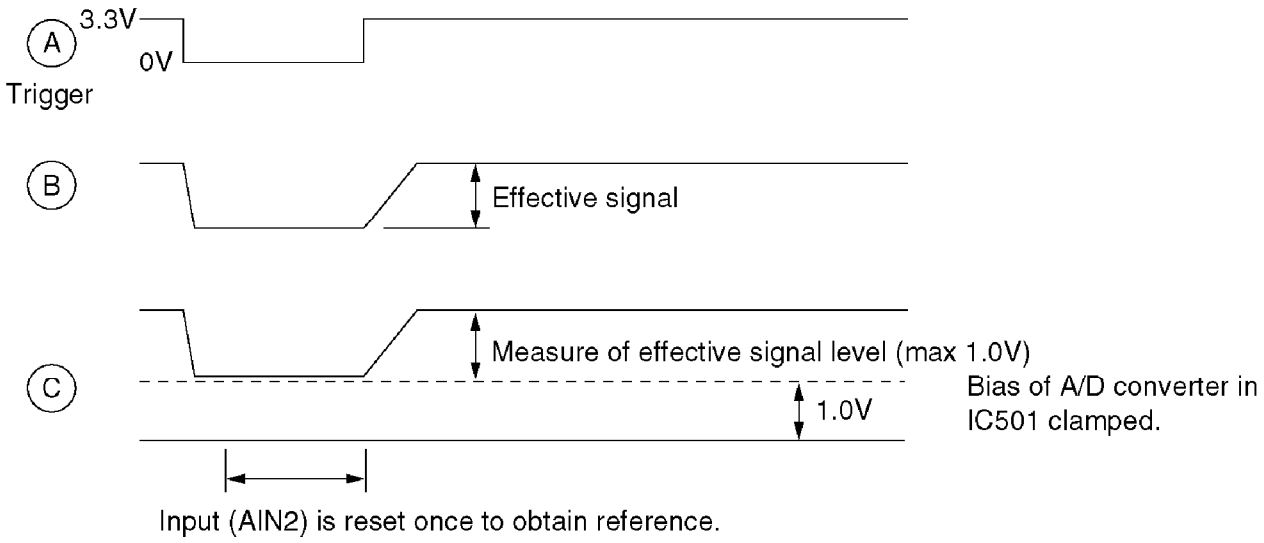
The thermistor changes the resistor according to the temperature and uses the thermistor's characteristics. The output of pin 139 of IC501 becomes a low level. Then when it becomes a high level, it triggers point A In point C, according to the voltage output time, the thermal head's temperature is detected.

After the thermal head temperature is converted to voltage in B, it is then changed to digital data in the A/D converter inside IC501. The CPU decides the strobe width of the thermal head according to this value. Therefore, this circuit can keep the thermal head at an even temperature in order to stabilize the printing density and prevent the head from being overheated.

Circuit Diagram



Timing Chart



Input (AIN2) is reset once to obtain reference.

CROSS REFERENCE:

THERMAL HEAD(

)

7.4. FACSIMILE SECTION

7.4.1. IMAGE DATA FLOW DURING FACSIMILE OPERATION

Copy (Fine, Super-Fine, Half Tone)

1. **Line information is read by CIS (to be used as the reference white level) via route1, and is input to IC501. Refer to BLOCK DIAGRAM( )**
2. **In IC501, the data is adjusted to a suitable level for A/D conversion in the Analogue Signal Processing Section, and via route2 it is input to A/D conversion (8 bit). After finishing A/D conversion, the data is input to the Image Processing Section via route3. Then via route4 and route5, it is stored in RAM as shading data.**
3. **The draft's information that is read by CIS is input to IC501 via route1. After it is adjusted to a suitable level for A/D conversion via route2, the draft's information is converted to A/D (8 bit), and it is input to the Image Processing Section. The other side, the shading data which flows from RAM via route6 and route7, is input to the Image Processing Section. After finishing the draft's information image processing, white is regarded as "0" and black is regarded as "1". Then via routes4 and 5, they are stored in RAM.**
4. **The white/black data stored as above via routes6 and8 is input to the P/S converter. The white/black data converted to serial data in the P/S converter is input to the Thermal Head via route9 and is printed out on recording paper.**

Note:
Standard: Reads 3.85 times/mm
Fine: Reads 7.7 times/mm
Super-Fine: Reads 15.4 times/mm

Transmission

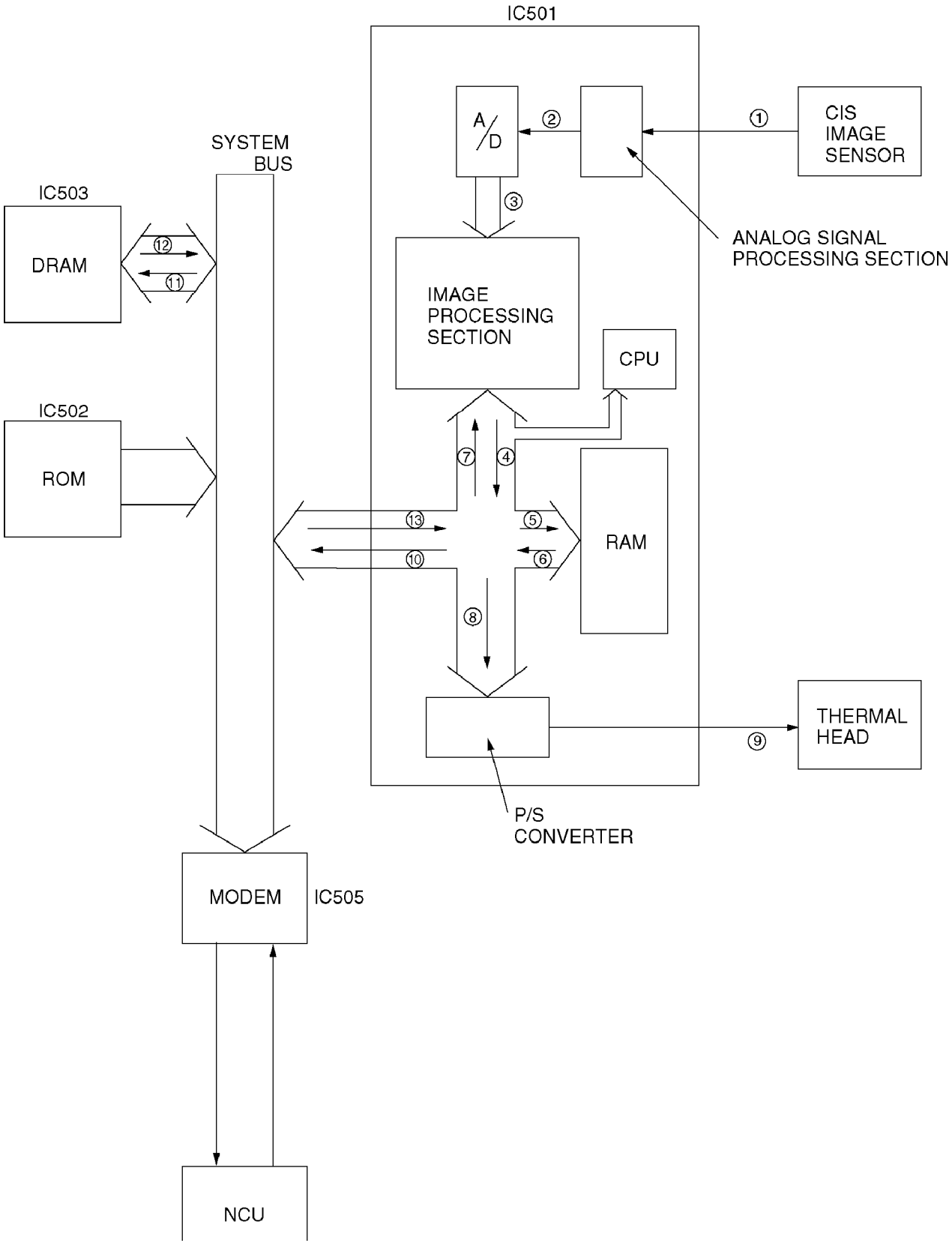
1. **Same processing as Copy items 1 - 3.**
2. **The data stored in the RAM of IC501 is output from IC501 via routes6 and 10, and is stored in the system bus.**
   Via route11, it is stored in the communication buffer inside DRAM (IC503).
3. **While retrieving data stored in the communication buffer synchronous with the modem, the CPU (inside IC501) inputs the data to the modem along route12,**

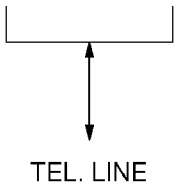
where it is converted to serial analogue data and forwarded over the telephone lines via the NCU Section.

Reception

1. **The serial analogue image data is received over the telephone lines and input to the modem via the NCU section, where it is demodulated to parallel digital data. Then the CPU (IC501) stores the data in the communication buffer DRAM (IC503) along route12.**
2. **The data stored in DRAM (IC503) is decoded by the CPU (IC501) via route12, and is stored in DRAM (IC503) via routes13 and 5.**
3. **Same processing as Copy item 4.**

7.4.2. BLOCK DIAGRAM


IC501
A/D
②
①
CIS
IMAGE
SENSOR
SYSTEM
BUS
③
IC503
DRAM
⑫
⑪
ANALOG SIGNAL
PROCESSING SECTION
IMAGE
PROCESSING
SECTION
CPU
IC502
ROM
⑦
④
⑬
⑤
RAM
⑩
⑥
⑧
THERMAL
HEAD
⑨
P/S
CONVERTER
MODEM
IC505
NCU

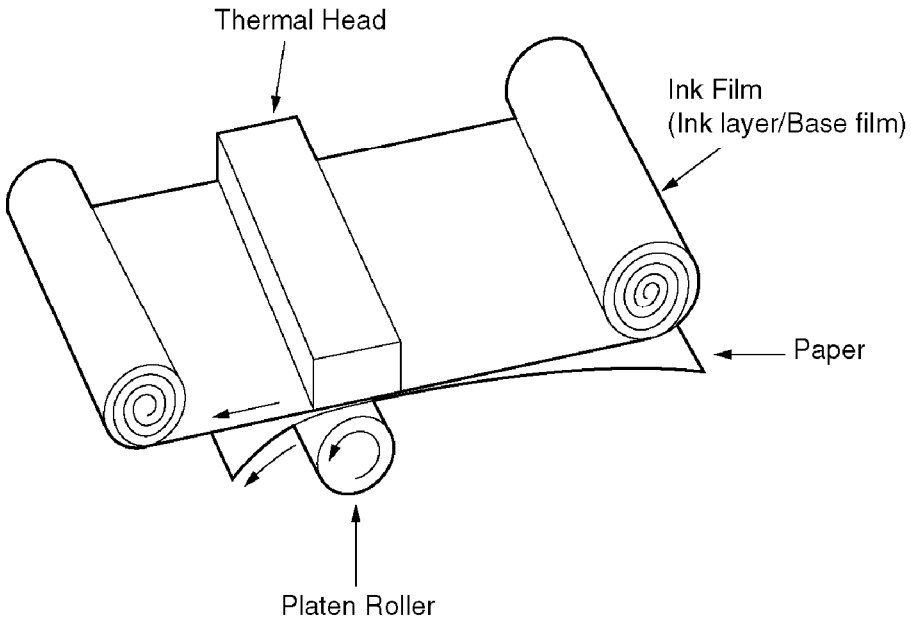


7.4.3. THERMAL HEAD

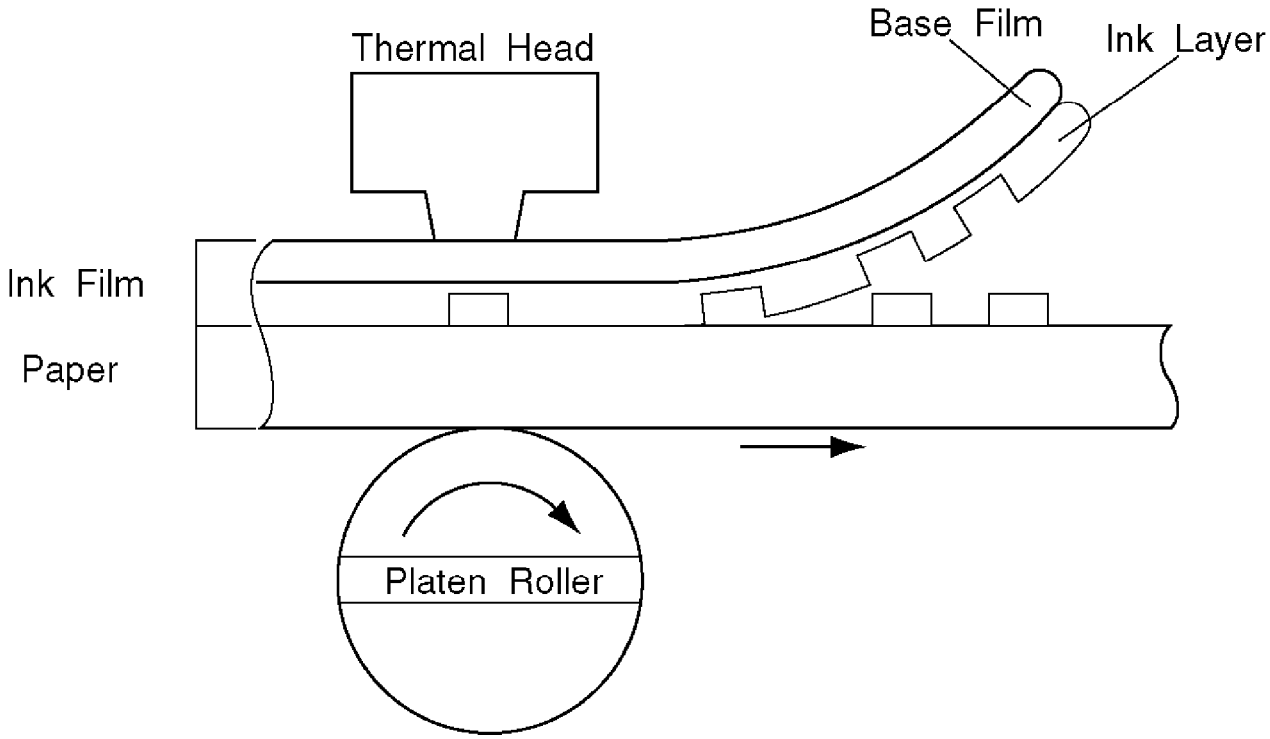
1. Function

This unit utilizes the state of the art thermal printer technology.
The ink film is chemically processed. The ink film is comprised of two parts: an ink layer and a base film. When the thermalhead contacts this ink film, it emits heat momentarily, and the ink layer is melted and transferred to the paper. If this continues, letters and/or diagrams appear, and the original document is reproduced.

COMPOSITION OF THE RECEIVE RECORD SECTION (THERMAL RECORDING FORMAT)



Thermal Transfer



2. Circuit Operation

There are 27 driver ICs aligned horizontally on the thermal head and each one of these ICs can drive 64 heat emitting registers. This means that one line is at a density of 64×27=1728 dots=(8 dots/mm).

White/Black (white=0, black=1) data in one line increments is synchronized at IC501 pin 117 (THCLK), and sent from IC501 pin 116 (THDAT) to the shift register of the ICs. The shift registers of the 27 ICs are connected in series, and upon the shift of dot increment 1728, all the shift registers become filled with data, and a latch pulse is emitted to each IC from IC501 pin 118 (THLAT).With this latch pulse, all the contents of the shift registers are latched to the latch registers. Thereafter, through the addition of strobes from the IC501 pins (103 - 105) only black dot locations (=1) among latched data activates the driver, and the current passes to heat the emitting body causing heat emission.

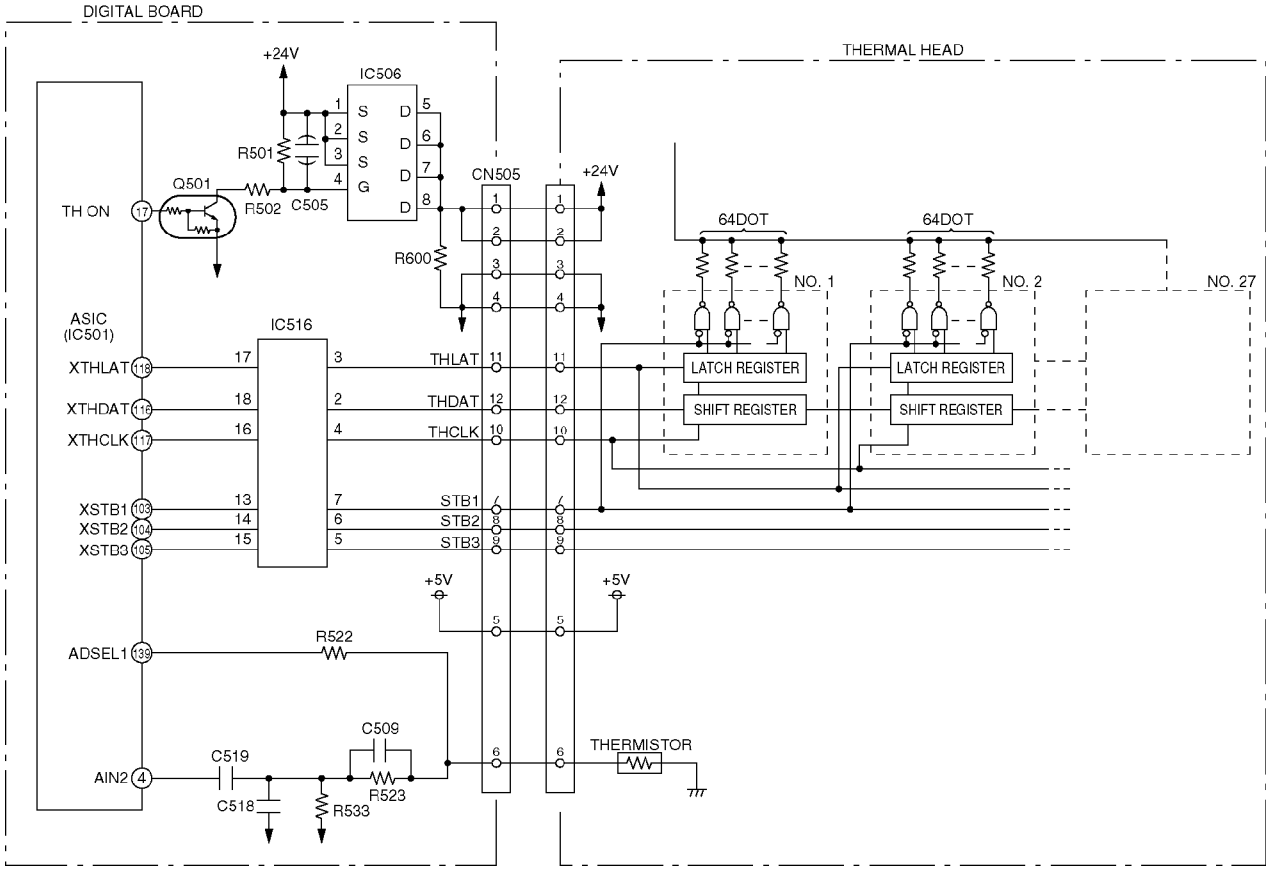
Here, the three line strobes, STB1 to STB3, impress at intervals of 9.216 msec, as required for one-line printout.

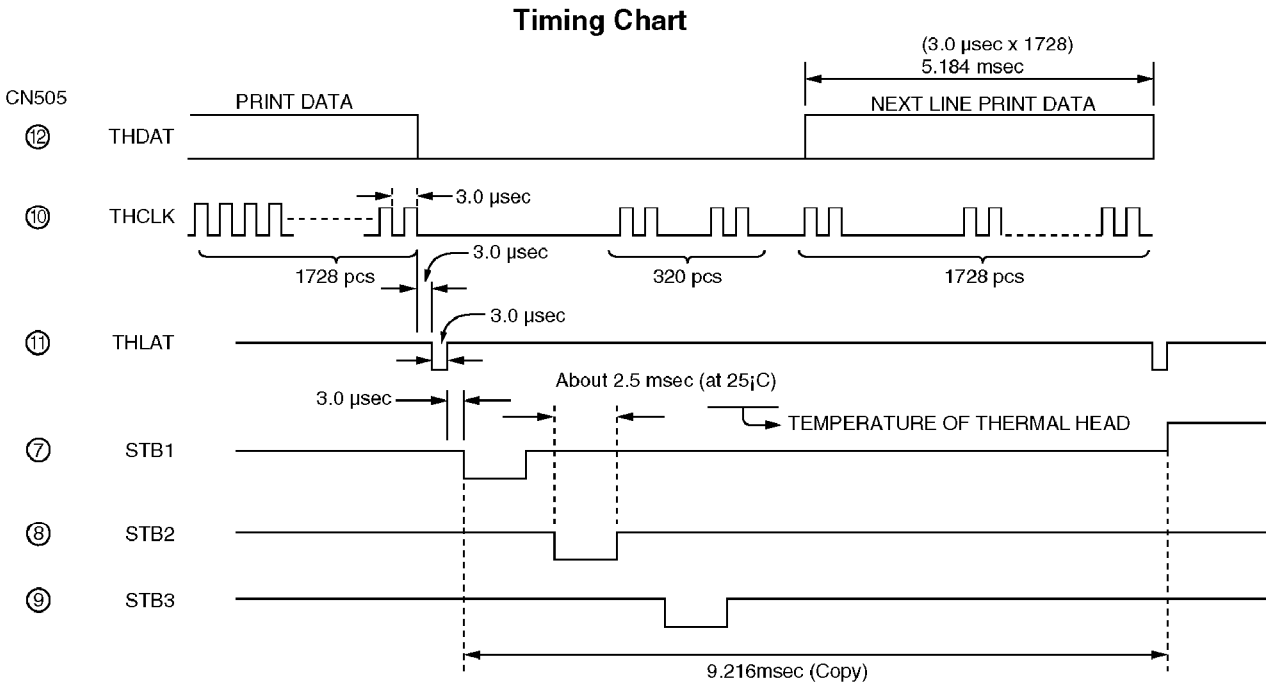
The sequence is shown on the next page. [Moreover, for the strobe width, the thermistor value inside the thermal head is detected according to IC501 pin 4. (See BLOCK DIAGRAM (

).) Depending on that value, the strobe width is recorded in ROM (IC502).

Accordingly, the strobe width is determined.
When the thermal head is not used, the IC501 (17, THON) becomes low, Q501 turns OFF, IC506 turns OFF, and the +24 V power supply for the thermal head driver is not impressed to protect the IC.

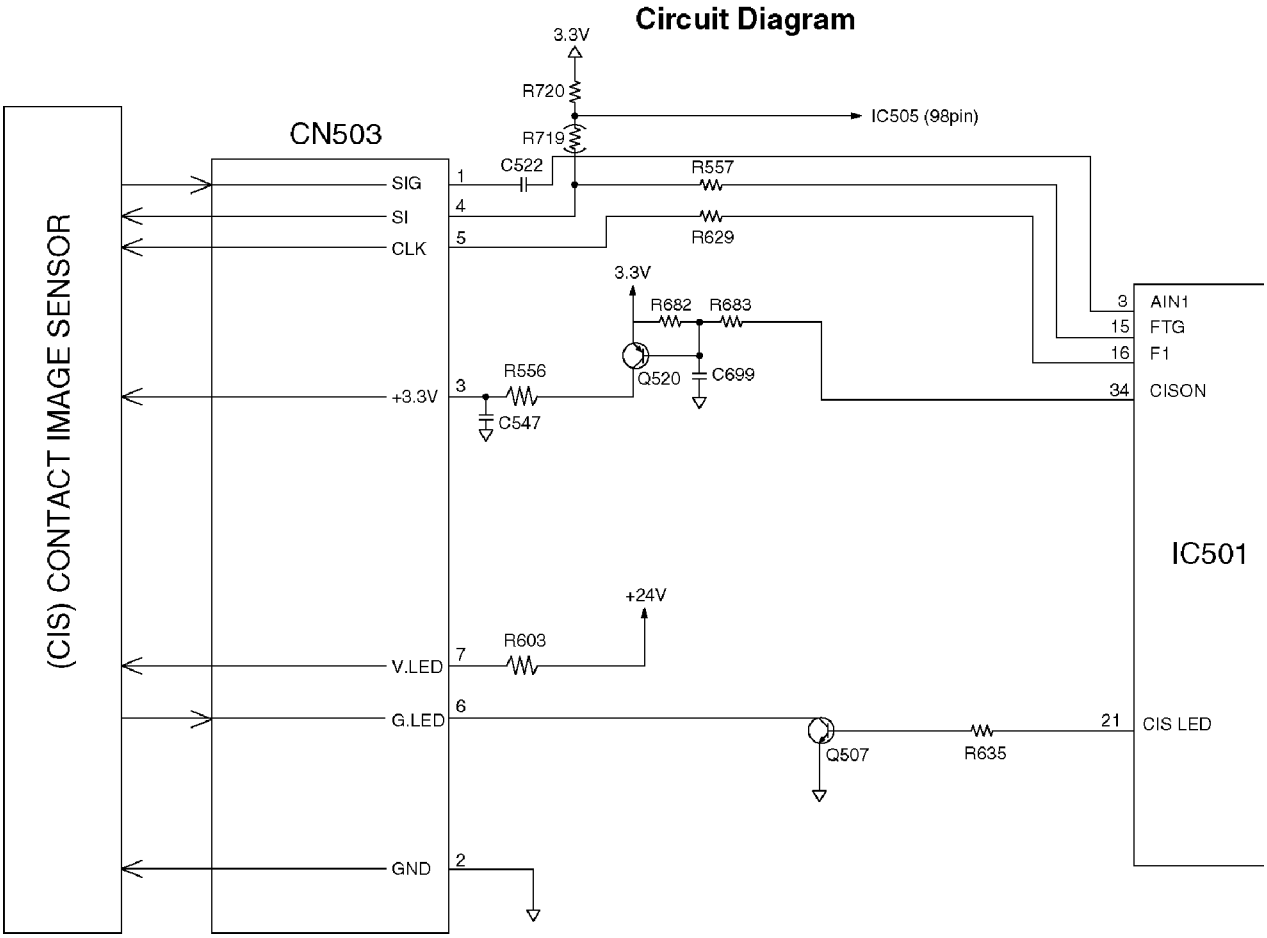
Circuit Diagram





7.4.4. SCANNING BLOCK

The scanning block of this device consists of a control circuit and a contact image sensor made up of a celfoc lens array, an LED array, and photoelectric conversion elements.



When an original document is inserted and the start button pressed, pin 21 of IC501 goes to a high level and the transistor Q507 turns on.This applies voltage to the LED array to light it. The contact image sensor is driven by each of the FTG-F1 signals output from IC501, and the original image illuminated by the LED array undergoes photoelectric conversion to output an analogue image signal (SIG). The analogue image signal is input to the system ASIC on AIN1 (pin 3 of IC501) and converted into 8-bit data by the A/D converter inside IC501. Then this signal undergoes digital processing in order to obtain a high-quality image.

7.4.5. STEPPING MOTOR DRIVE CIRCUIT

1. Function

The stepping motor works for both transmission and reception.

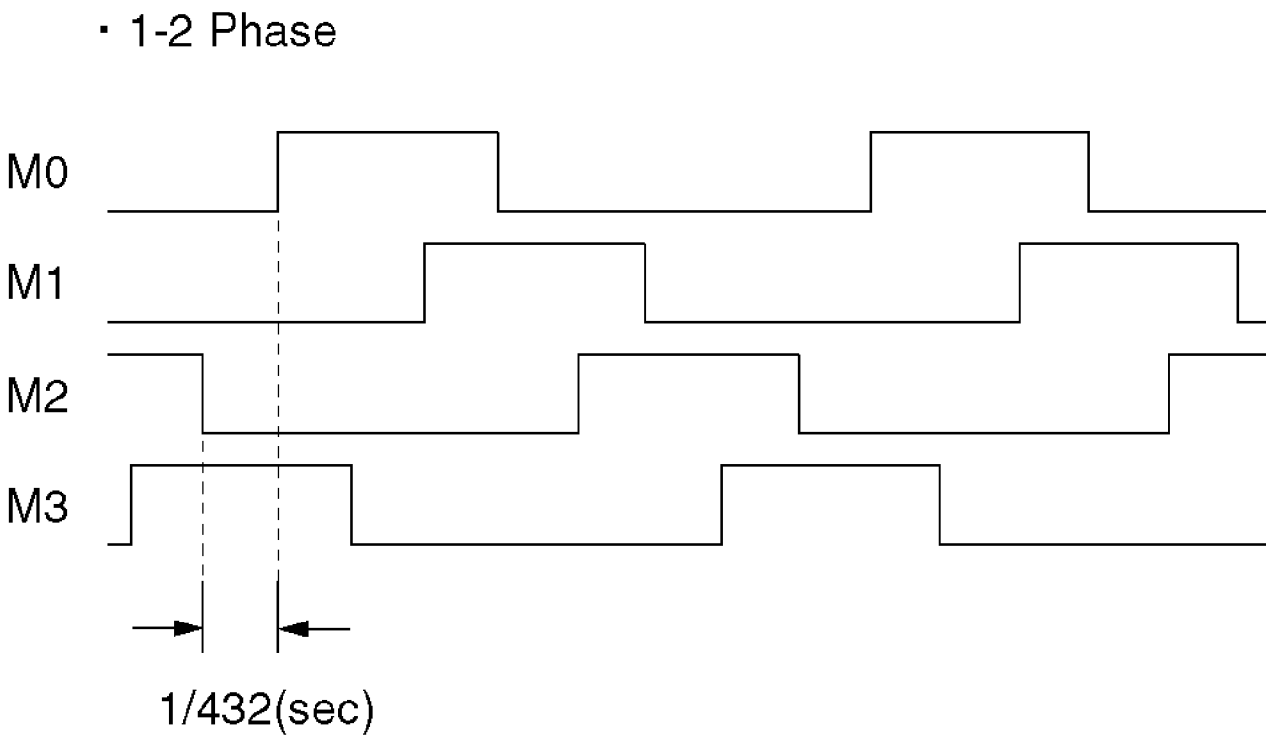
2. Motor

During motor driving, pin 131 of ASIC IC501 becomes a high level, and Q503, Q502 turns ON. As a result, +24V is supplied to the motor coil.

Stepping pulses are output from ASIC IC501 pins, 125, 128~130, causing driver

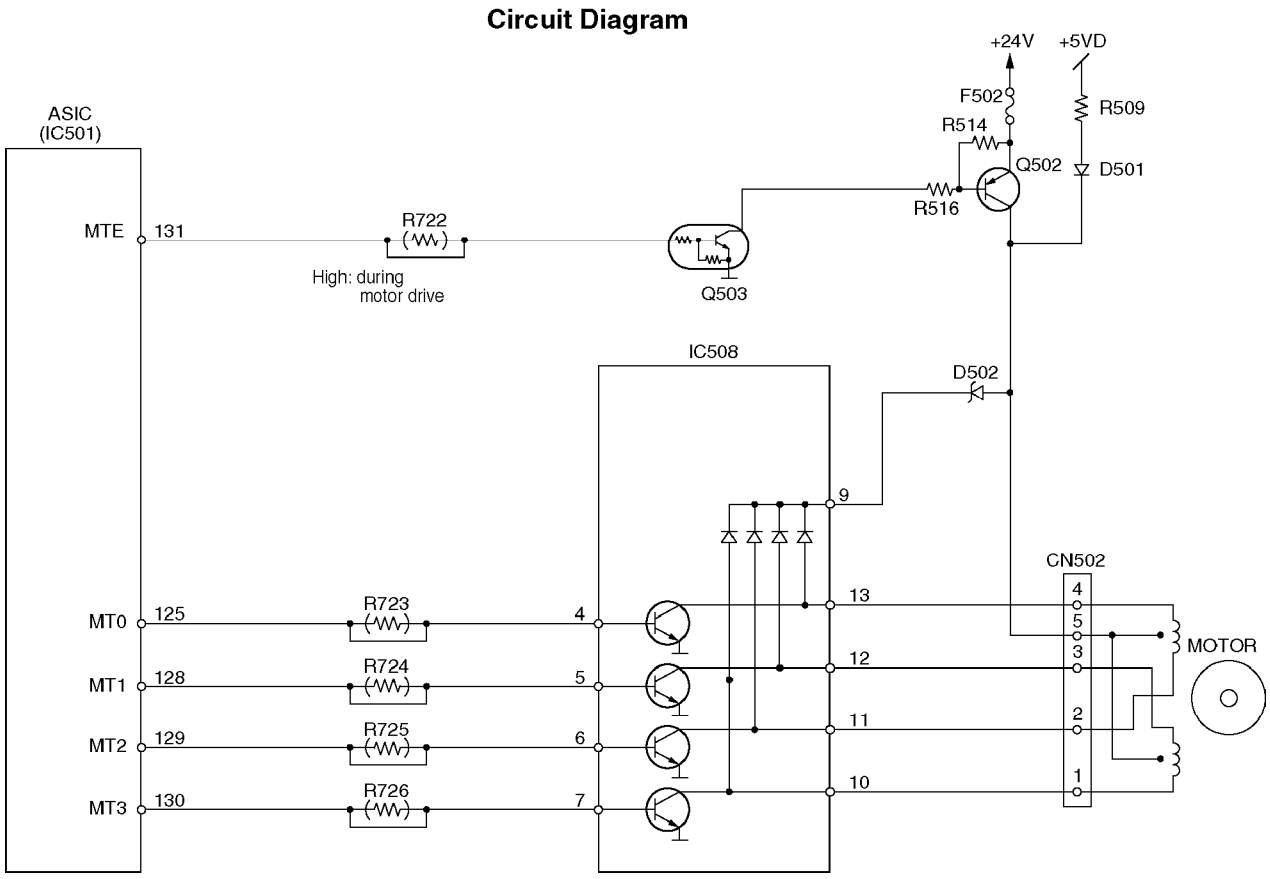
IC508 pins, 13~10 to drive the Motor Coil. The motor coil is energized sequentially in 2 phase increments, which causes a 1-step rotation. A 1-step rotation feeds 0.13 mm of recording paper or document paper.
The timing chart is below.

Stepping Monitor Timing Chart



Stepping Motor Drive Mode

Function	Mode	Phase Pattern	Speed
Copy	Fine	1-2	432 pps
FAX	Standard	1-2	432 pps
	Fine or Half tone	1-2	432 pps
Paper Feed	———	1-2	432 pps
Stand-by	———	All phases are currently off.	None



The motor suspends while it is in the receive mode (about 70~80 msec), pin 131 of ASIC IC501 becomes a low level and Q503 turns OFF. Then Q502 also turns OFF, and instead of +24 V, +5 V is supplied through D501 so that the motor is held in place. When the system is in the stand-by mode, all of the motor drive transistors turn OFF. Consequently, the motor current stops.

7.4.6. GEAR SECTION

This model provides a motor-driven gear mechanism for transmitting/copying documents and printing fax data. In this chapter, you will see how the gears work to select and operate a mode and how the gear section, sensors and rollers mechanically work during the main operations (FAX transmission, FAX reception and Copy).

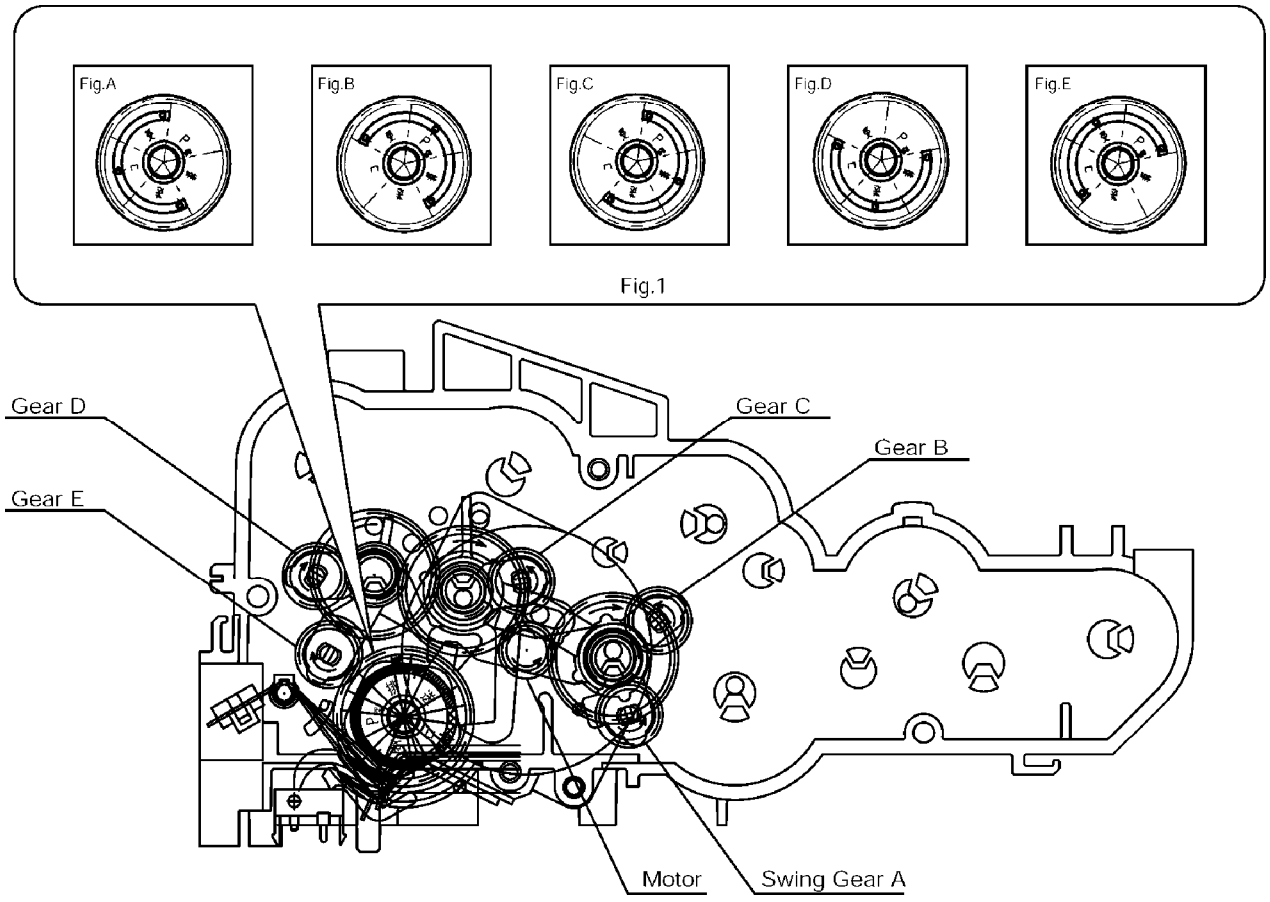
7.4.6.1. MODE SELECTION (See Fig. 1)

When a motor with Drive Motor Gear attached rotates counterclockwise (CCW), Swing Gear E engages CAM Gear to rotate counterclockwise (CCW). This operation

provide five mode options (A: Transmit mode, B: Paper-Pickup mode, C: Receive mode and D: Copy mode, E: Paper Exit mode) selected by the Sensor Switch. (The Sensor Switch Lever's position in the CAM Gear controlled by the software selects a specific mode.) You can see which mode is selected by confirming the Mode Marker's position as shown in
Fig. 1.
(Ex. If the Mode Marker is in position A, a transmit mode is selected.)

Note:
The arrows show the directions in which the active gears turn around.

Fig. 1: Mode Selection



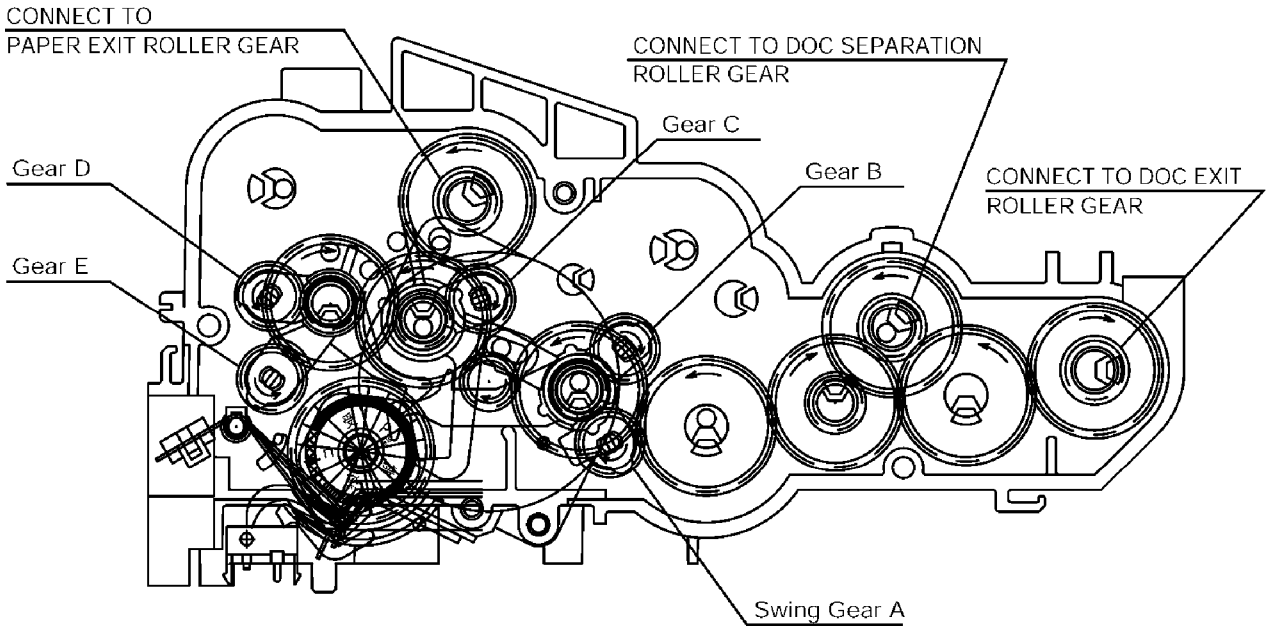
7.4.6.2. MODE OPERATION

Once a mode is selected, the Drive Motor Gear rotates clockwise (CW) and then the controlling positions of Swing Gears A, B and C, D, E determine which gears

convey their drive power in each mode.

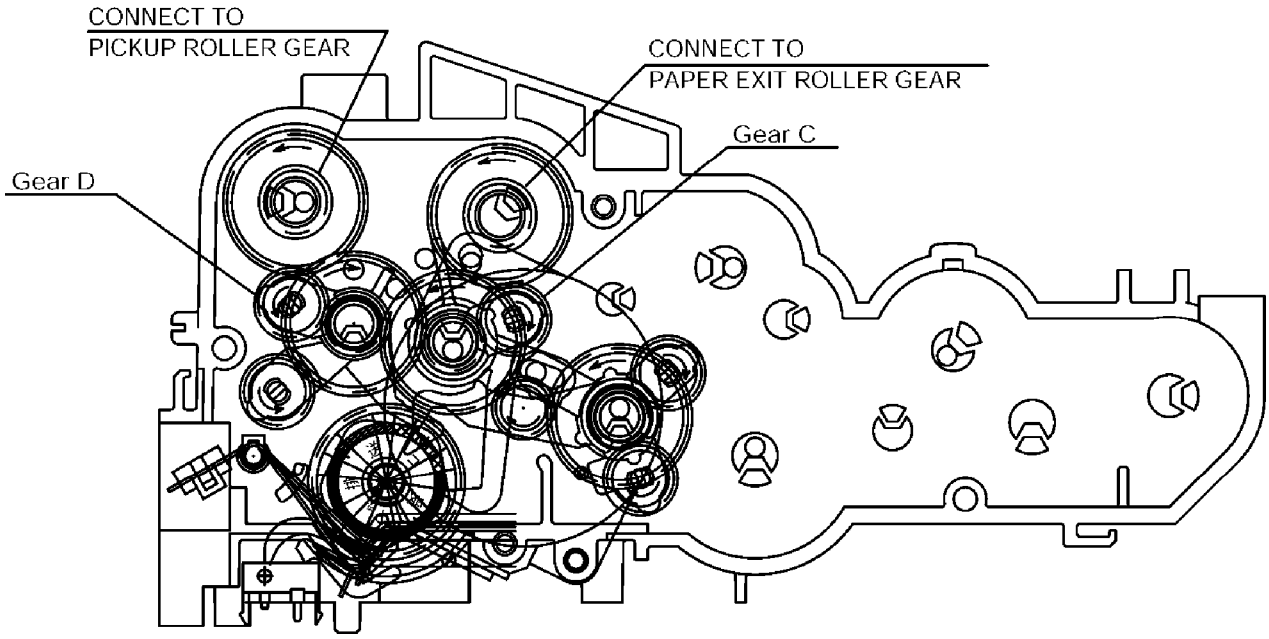
A. Transmit mode (See Fig. A.):
The Swing Gear A engages with the next gear to drive Doc Separation Roller and Doc Exit Roller.
The Swing Gear C engages with the next gear to drive Paper Exit Roller.

Fig. A: Transmit mode



B. Paper-Pickup mode (See Fig. B):
The Swing Gear C engages with the next gear to drive Paper Exit Roller.
The Swing Gear D engages with the next gear to drive Pickup Roller.

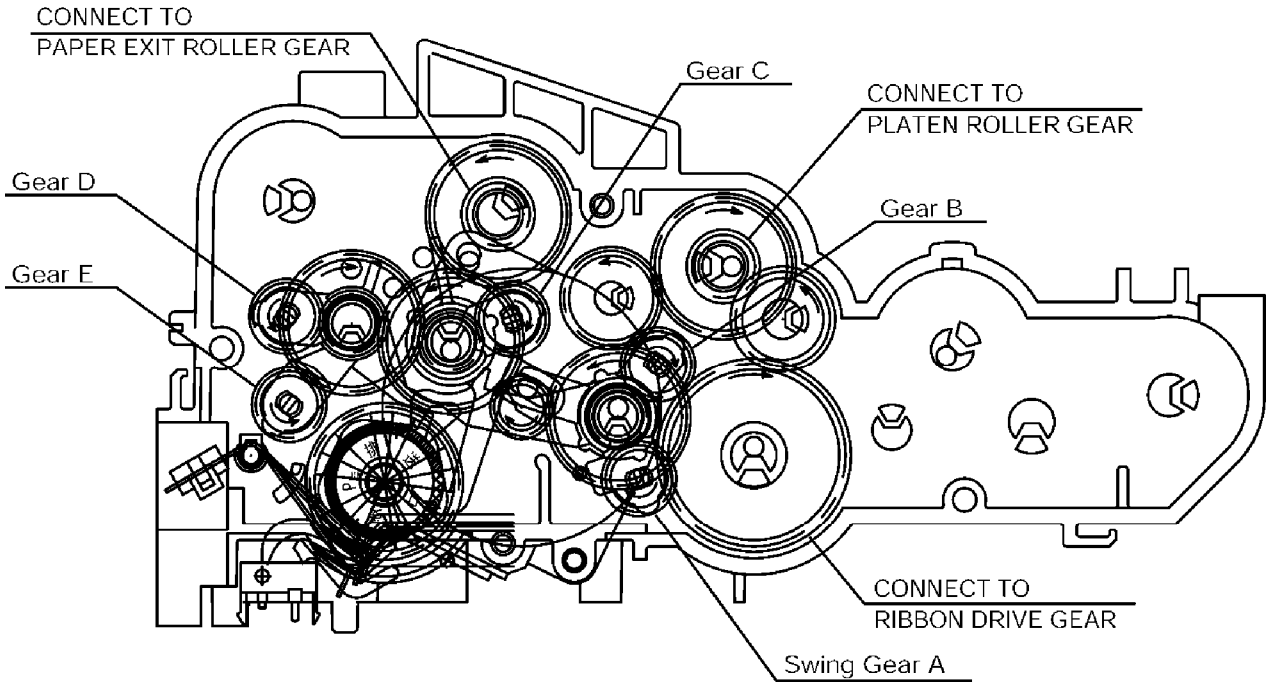
Fig. B: Paper-Pickup mode



Note*:
See "Sensor Location" in SENSORS AND SWITCHES(
).

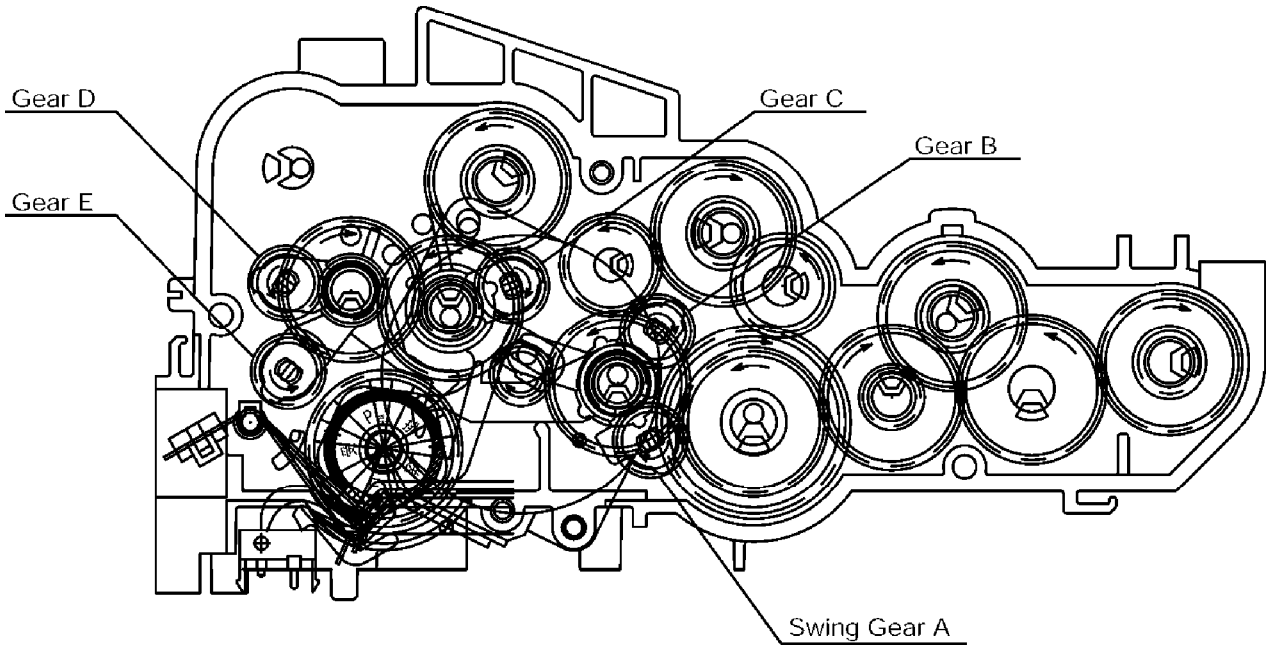
C. Receive mode (See Fig. C.):
The Swing Gear B engages with the next gear to drive Platen Roller gear and Ribbon Drive Gear.
The Swing Gear C engages with the next gear to drive Paper Exit Roller Gear.

Fig. C: Receive mode



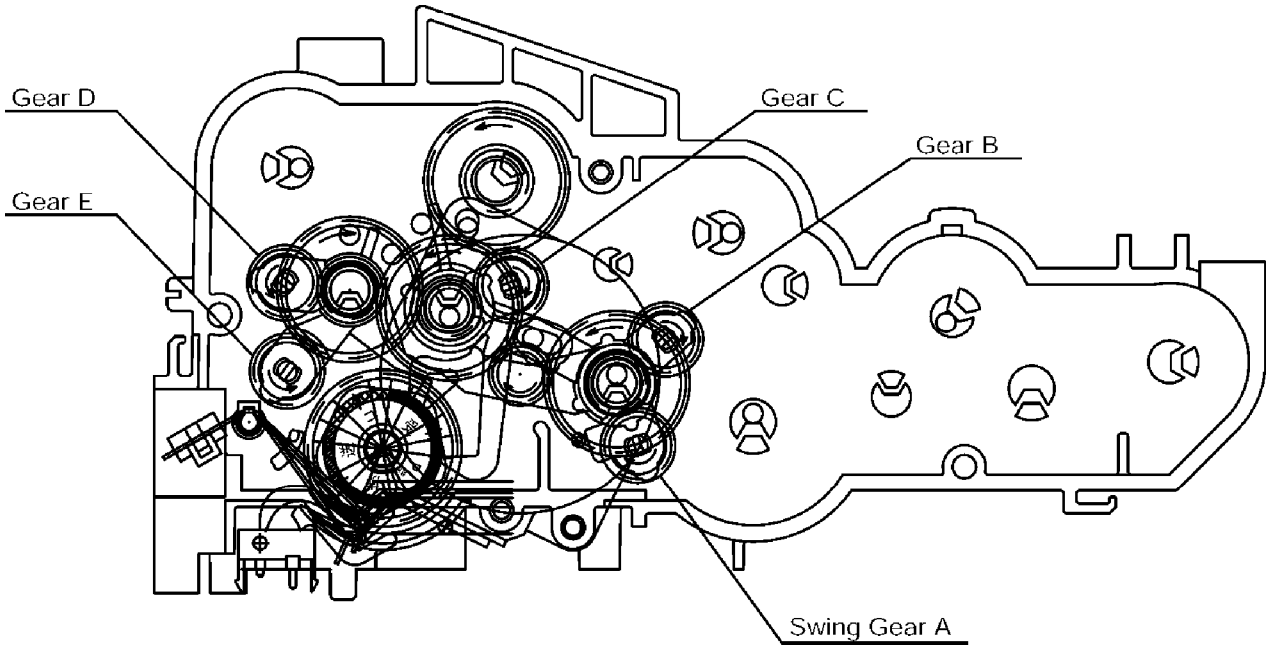
D. Copy mode (See Fig. D.):
“Copy mode” = “Transmit mode“ + “Receive mode“
The Swing Gear A engages with the next gear to drive Doc Separation Roller and Doc Exit Roller.
The Swing Gear B engages with the next gear to drive Platen Roller gear and Ribbon Drive Gear.
The Swing Gear C engages with the next gear to drive Paper Exit Roller.

Fig. D: Copy mode



E. Paper Exit mode (See Fig. E.):
The Swing Gear C engages with the next gear to drive Paper Exit Roller.

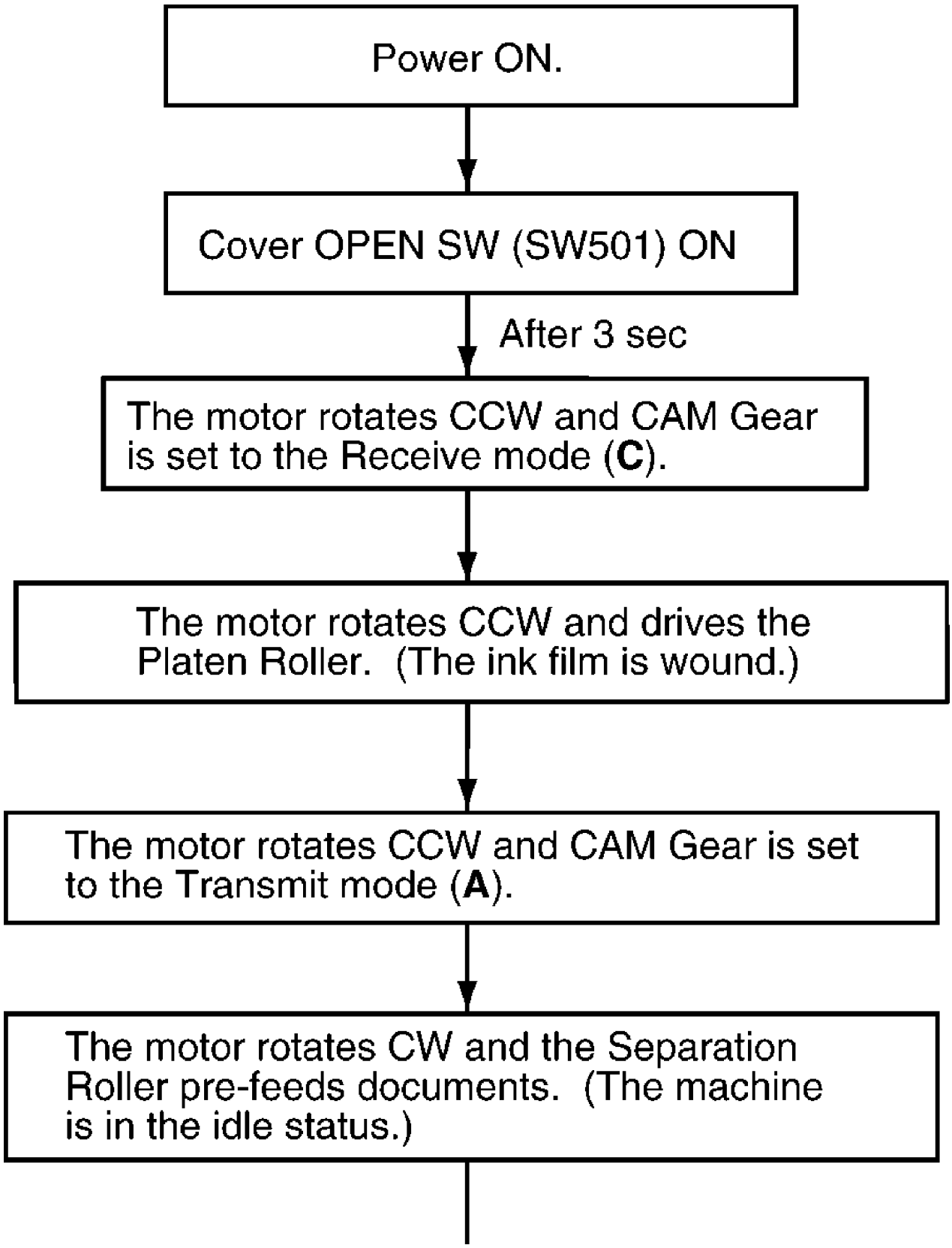
Fig. E: Paper Exit mode

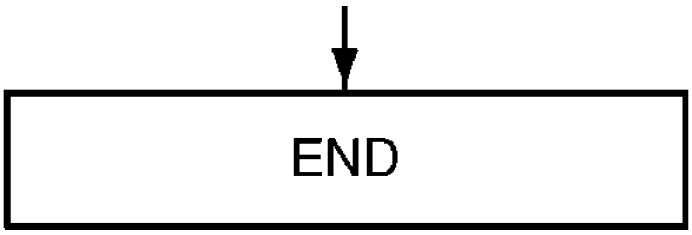


7.4.6.3. MECHANICAL MOVEMENTS IN THE MAIN OPERATIONS

(transmitting documents, receiving faxes and copying)

7.4.6.3.1. IDLE STATUS

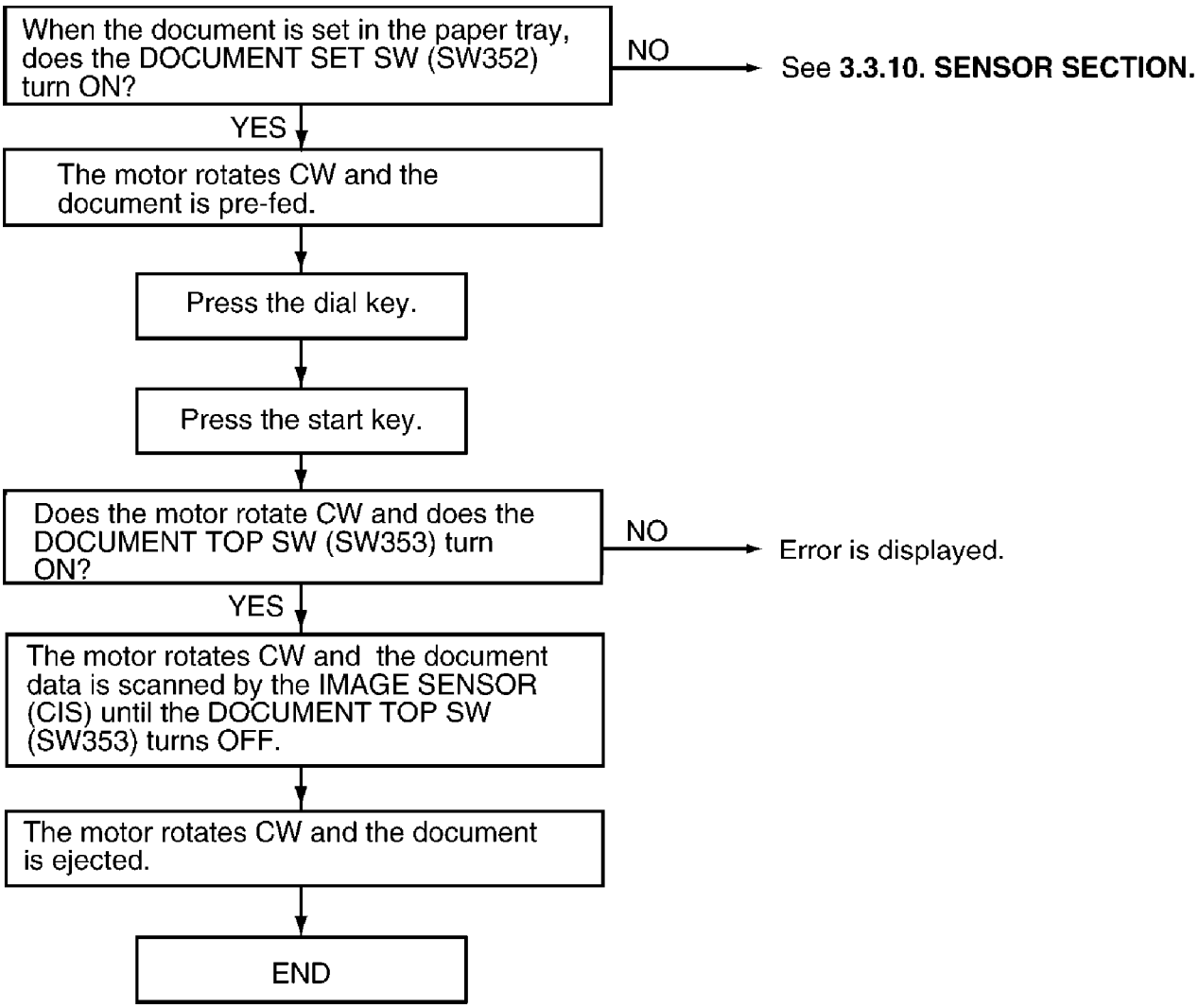

Power ON.
Cover OPEN SW (SW501) ON
After 3 sec
The motor rotates CCW and CAM Gear is set to the Receive mode (C).
The motor rotates CCW and drives the Platen Roller. (The ink film is wound.)
The motor rotates CCW and CAM Gear is set to the Transmit mode (A).
The motor rotates CW and the Separation Roller pre-feeds documents. (The machine is in the idle status.)



Note:

See “Sensor Locations” in SENSORS AND SWITCHES( ).

7.4.6.3.2. TRANSMITTING DOCUMENTS

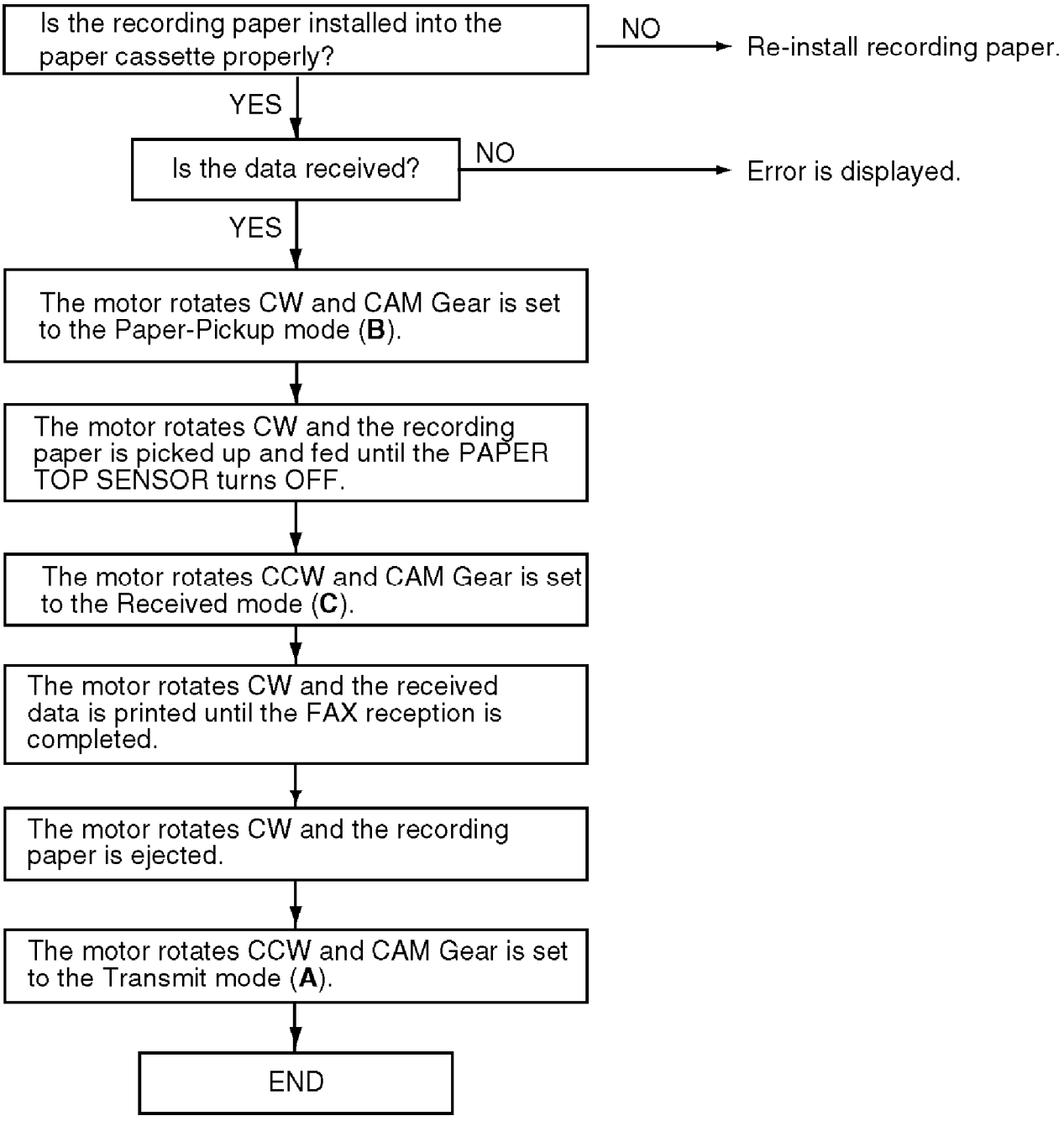

When the document is set in the paper tray, does the DOCUMENT SET SW (SW352) turn ON?
NO
See 3.3.10. SENSOR SECTION.
YES
The motor rotates CW and the document is pre-fed.
Press the dial key.
Press the start key.
Does the motor rotate CW and does the DOCUMENT TOP SW (SW353) turn ON?
NO
Error is displayed.
YES
The motor rotates CW and the document data is scanned by the IMAGE SENSOR (CIS) until the DOCUMENT TOP SW (SW353) turns OFF.
The motor rotates CW and the document is ejected.
END

CROSS REFERENCE:

SENSOR SECTION(

).

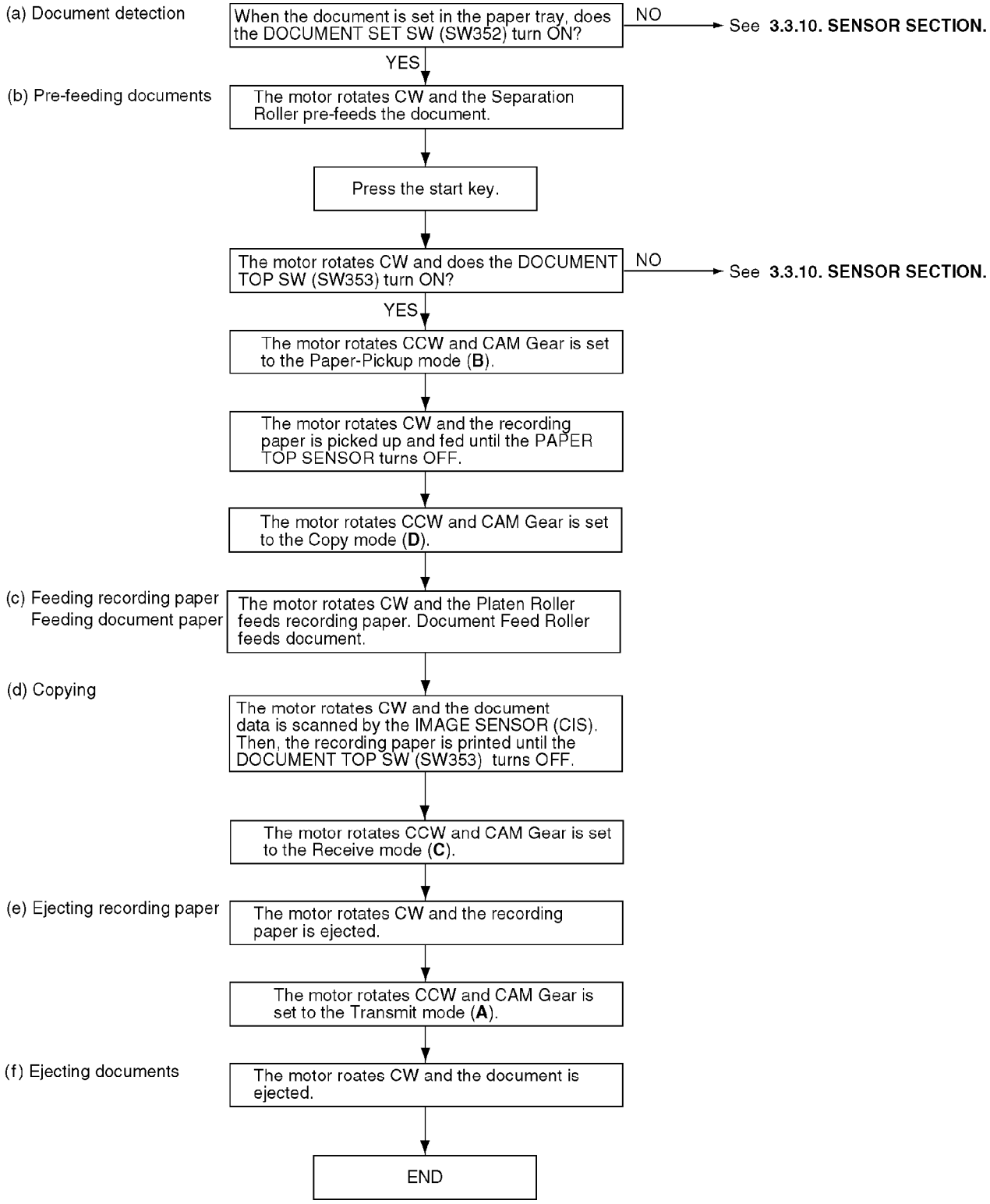
7.4.6.3.3. RECEIVING FAX


Is the recording paper installed into the paper cassette properly?
NO
Re-install recording paper.
YES
Is the data received?
NO
Error is displayed.
YES
The motor rotates CW and CAM Gear is set to the Paper-Pickup mode (B).
The motor rotates CW and the recording paper is picked up and fed until the PAPER TOP SENSOR turns OFF.
The motor rotates CCW and CAM Gear is set to the Received mode (C).
The motor rotates CW and the received data is printed until the FAX reception is completed.
The motor rotates CW and the recording paper is ejected.
The motor rotates CCW and CAM Gear is set to the Transmit mode (A).
END

Note:

See "Sensor Locations" in SENSORS AND SWITCHES(
).

7.4.6.3.4. COPYING


(a) Document detection
When the document is set in the paper tray, does the DOCUMENT SET SW (SW352) turn ON?
NO
See 3.3.10. SENSOR SECTION.
YES
(b) Pre-feeding documents
The motor rotates CW and the Separation Roller pre-feeds the document.
Press the start key.
The motor rotates CW and does the DOCUMENT TOP SW (SW353) turn ON?
NO
See 3.3.10. SENSOR SECTION.
YES
The motor rotates CCW and CAM Gear is set to the Paper-Pickup mode (B).
The motor rotates CW and the recording paper is picked up and fed until the PAPER TOP SENSOR turns OFF.
The motor rotates CCW and CAM Gear is set to the Copy mode (D).
(c) Feeding recording paper
Feeding document paper
The motor rotates CW and the Platen Roller feeds recording paper. Document Feed Roller feeds document.
(d) Copying
The motor rotates CW and the document data is scanned by the IMAGE SENSOR (CIS). Then, the recording paper is printed until the DOCUMENT TOP SW (SW353) turns OFF.
The motor rotates CCW and CAM Gear is set to the Receive mode (C).
(e) Ejecting recording paper
The motor rotates CW and the recording paper is ejected.
The motor rotates CCW and CAM Gear is set to the Transmit mode (A).
(f) Ejecting documents
The motor roates CW and the document is ejected.
END

Note:

See “Sensor Locations” in SENSORS AND SWITCHES( ).

CROSS REFERENCE:
SENSOR SECTION( )

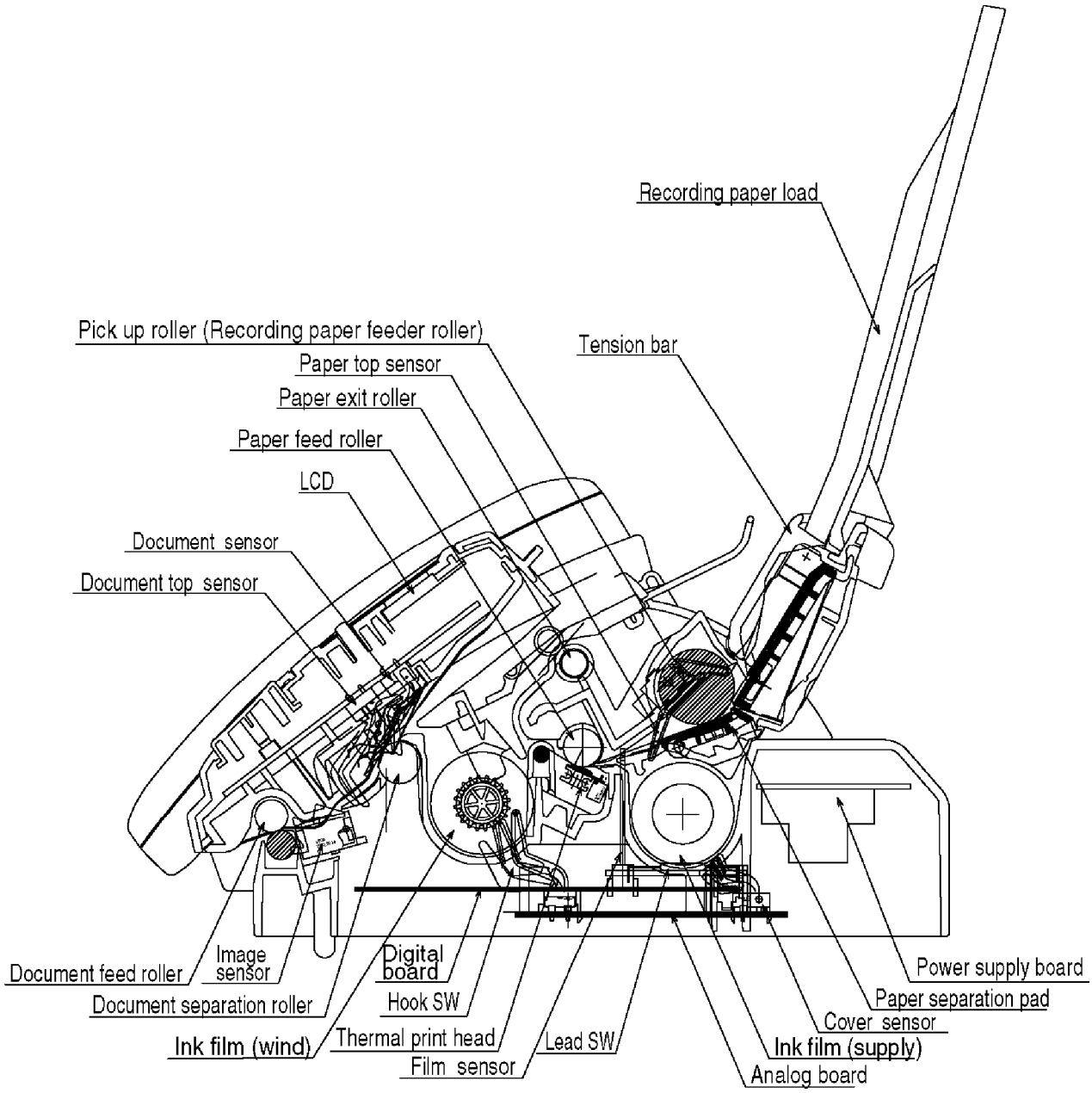
7.5. SENSORS AND SWITCHES

All of the sensor and switches are shown below.

Sensor Circuit Location	Sensor	Sensor or Switch Name	Message Error
Operation Panel	SW352	Document set SW	[CHECK DOCUMENT]
	SW353	Document top SW	[REMOVE DOCUMENT]
Digital PCB	SW501	Film End	[CHECK FILM]
HOOK SW PCB	SW201	Hook	————
	SW202	Motor Position	————
U-TURN BLOCK	Paper top SW	Paper Top	[PAPER JAMMED]
Sensor PCB	SW101	Film Detection	[FILM EMPTY]
	SW102	Cover Open SW	[CHECK COVER]

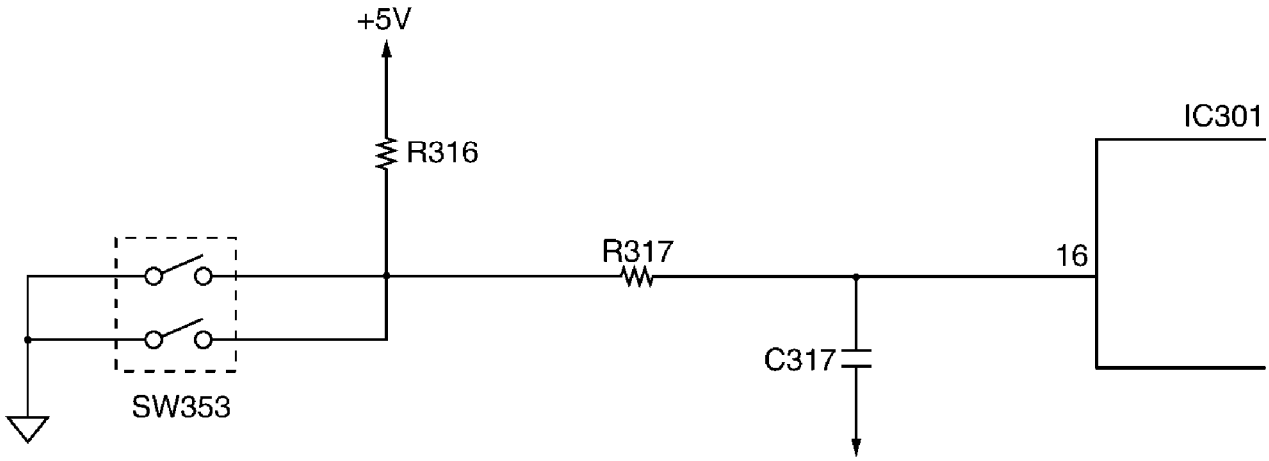
Note:
See TEST FUNCTIONS( ). (#815: Sensor Check)

Sensor Locations



7.5.1. DOCUMENT TOP SW (SW353)

When a document is brought to the read position, the SW turns ON, and the input signal of IC301-16 pin (Operation) becomes a low level. When there is no document at the read position, the SW turns OFF, and the input signal of IC301-16 pin (Operation) becomes a high level.

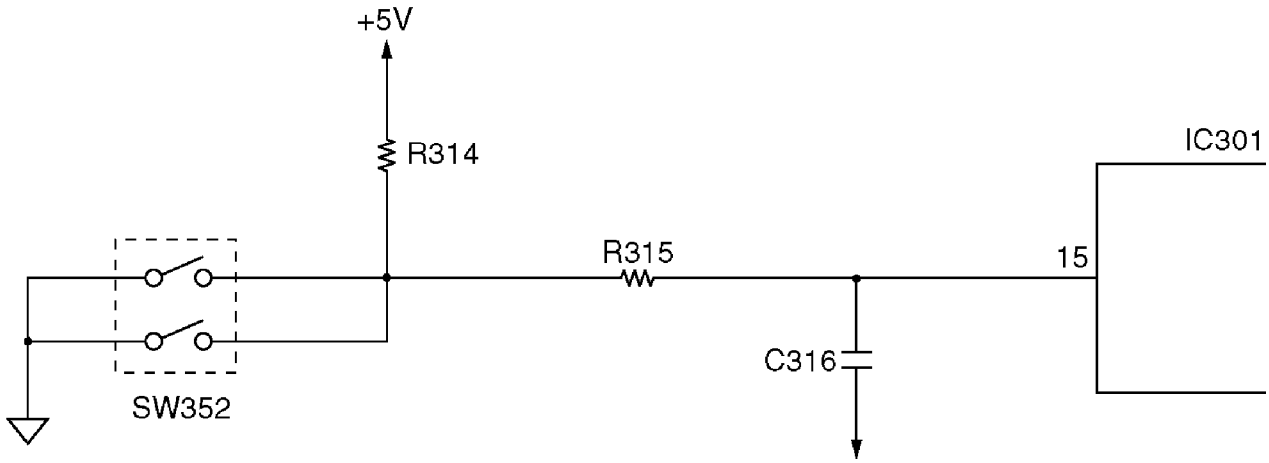


Operation Board

	SW	Signal (IC301-16 pin)
Out of the Read Position	OFF	High level
At the Read Position	ON	Low level

7.5.2. DOCUMENT SET (SW352)

When a document is set, the SW turns ON, and the input signal of IC301-15 pin (Operation) becomes a low level. When there is no document, the SW turns ON, and the input signal of IC301-15 pin (Operation) becomes a high level.

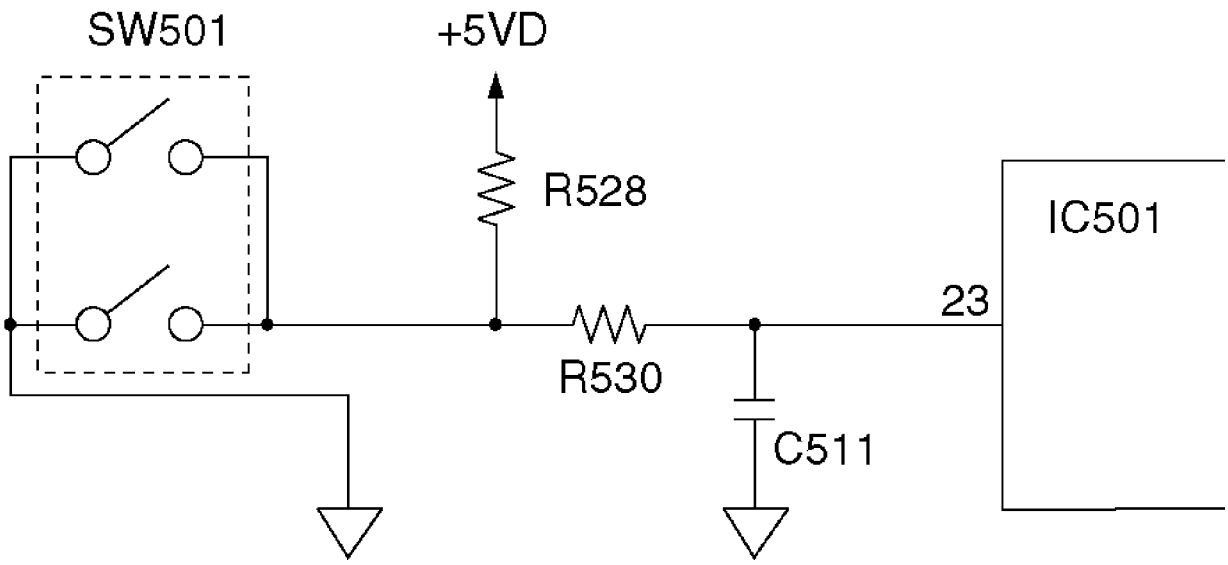


Operation Board

	SW	Signal (IC301-15 pin)
No document	OFF	High level
Set document	ON	Low level

7.5.3. FILM END SW (SW501)

When a film is set, the SW turns ON, and the input signal of IC501-23 pin (Digital) becomes a low level. When there is no film, the SW turns OFF, and the input signal of IC501-23 pin (Digital) becomes a high level.

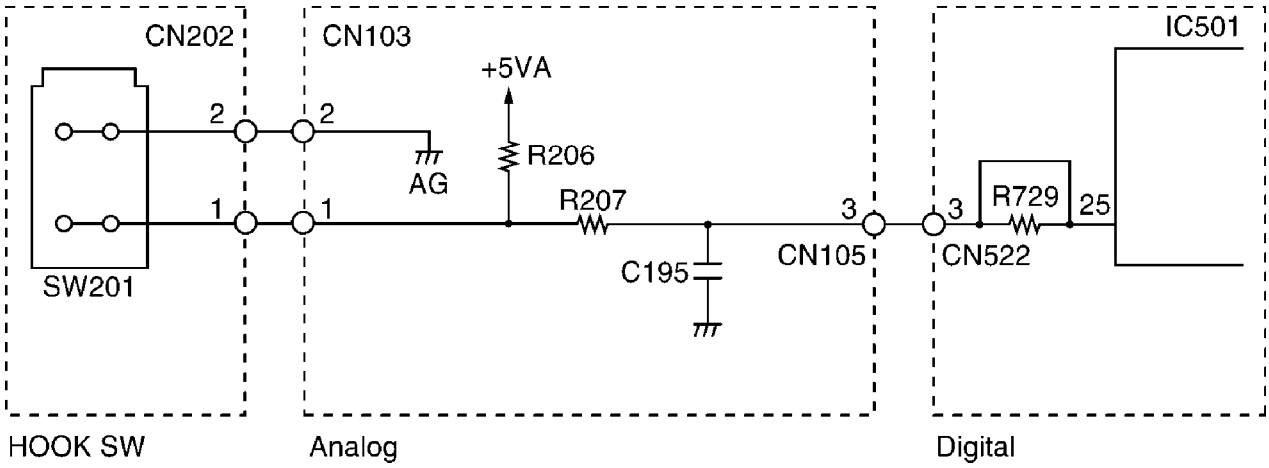


Digital Board

	SW	Signal (IC501-23 pin)
No film	OFF	High level
Set a film	ON	Low level

7.5.4. HOOK SWITCH (SW201)

When the handset is lifted, the switch turns ON, and the signal at pin 25 of IC501 becomes low.
When the handset is returned, the switch turns OFF, and the signal at pin 25 of IC501 becomes high.

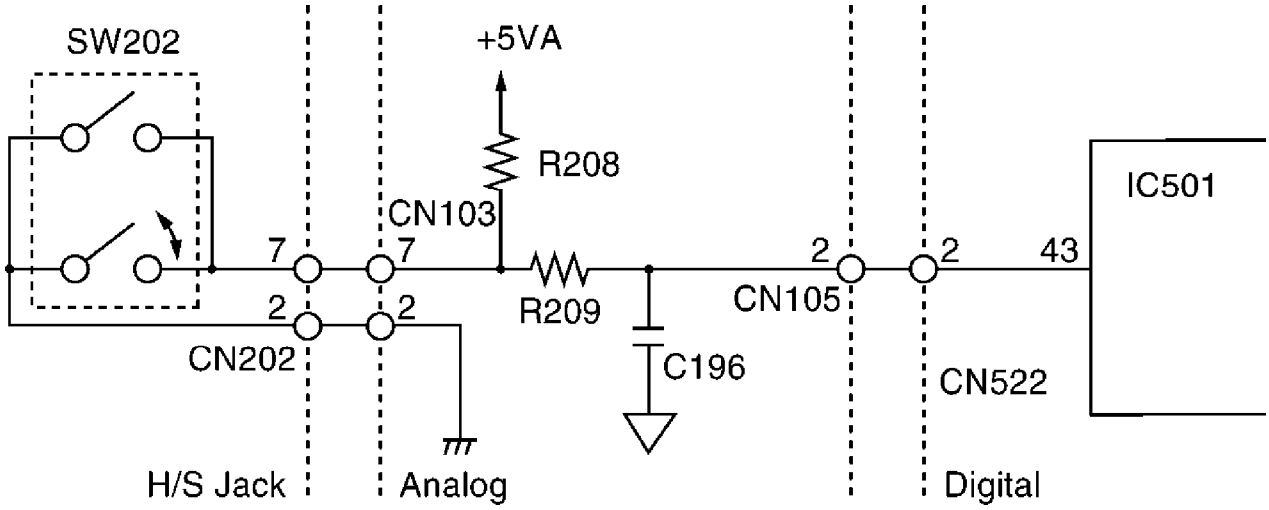


Digital Board

	SW	Signal (IC501-25 pin)
ON-Hook	OFF	High level
OFF-Hook	ON	Low level

7.5.5. MOTOR POSITION SENSOR (SW202)

This sensor is a detection switch for recording the position of the CAM.

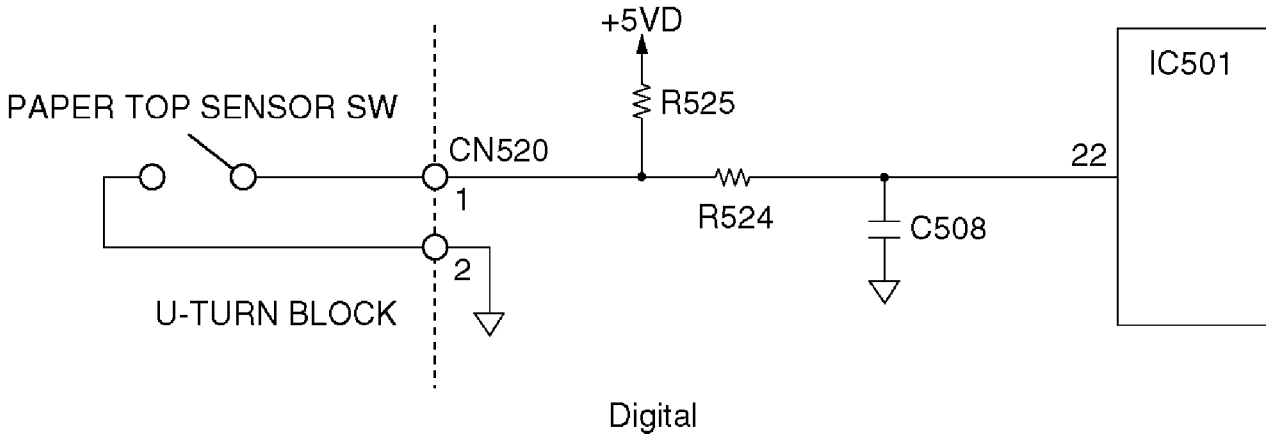


Digital Board

	Signal (IC501-43 pin)
Home position	Low level
Other	High level

7.5.6. PAPER TOP SENSOR

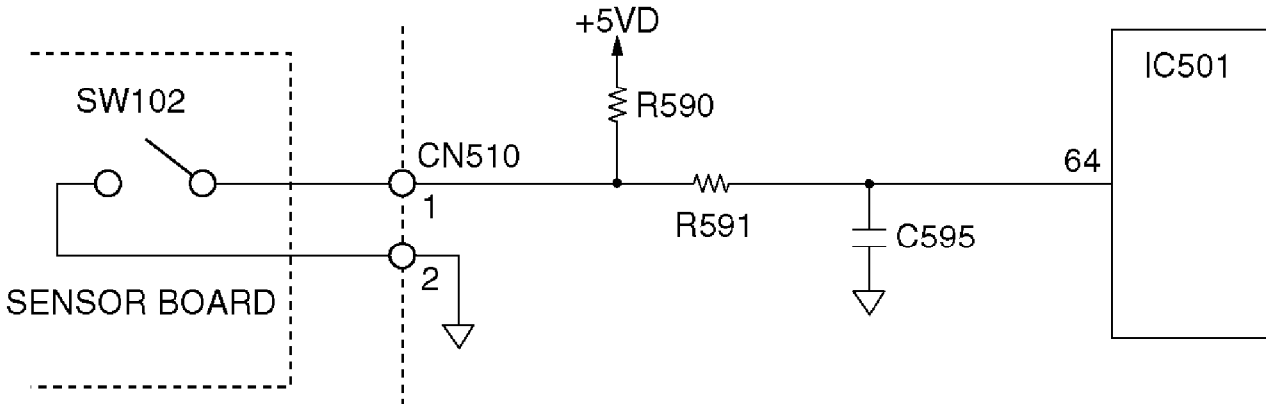
When the recording paper is loaded on the print head or the recording paper cover is opened, the paper top sensor SW turns ON, and the input signal of IC501-22 pin becomes a low level. Usually, the SW turns OFF, and the input signal of IC501-22 pin becomes a high level.



	SW	Signal (IC501-22 pin)
Set recording paper or paper cover is opened	ON	Low level
No recording paper or paper cover is closed	OFF	High level

7.5.7. COVER OPEN SW (SW102)

When the U-TURN BLOCK is closed, the SW becomes ON, and the input signal of IC501-64 pin becomes a low level.
When the cover is opened, the SW becomes OFF, and the input signal of IC501-64 pin becomes a high level.



	SW	Signal (IC501-64 pin)
Cover is opened	OFF	High level
Cover is closed	ON	Low level

7.6. MODEM SECTION

7.6.1. FUNCTION

The unit uses a 1 chip modem (IC505) that serves as an interface between the control section for FAX transmission and reception and the telephone line. During a transmitting operation, the digital image signals are modulated and sent to the telephone line.
During a receiving operation, the analogue image signals which are received via the telephone line are demodulated and converted into digital image signals. The communication format and procedures for FAX communication are standardized by ITU-T. This 1 chip modem (IC505) has hardware which sends and detects all of the necessary signals for FAX communication.
It can be controlled by writing commands from the CPU (IC501: inside ASIC) to the register in the modem (IC505).
This modem (IC505) also sends DTMF signals, generates a call tone (from the speaker), and detects a busy tone and dial tones.
Overview of Facsimile Communication Procedures (ITU-T Recommendation):

1. ON CCITT (International Telegraph and Telephone Consultative Committee)
The No. XIV Group of CCITT, one of the four permanent organizations of the International Telecommunications Union (ITU), investigates and make recommendations on international standards for facsimiles.

2. Definition of Each Group

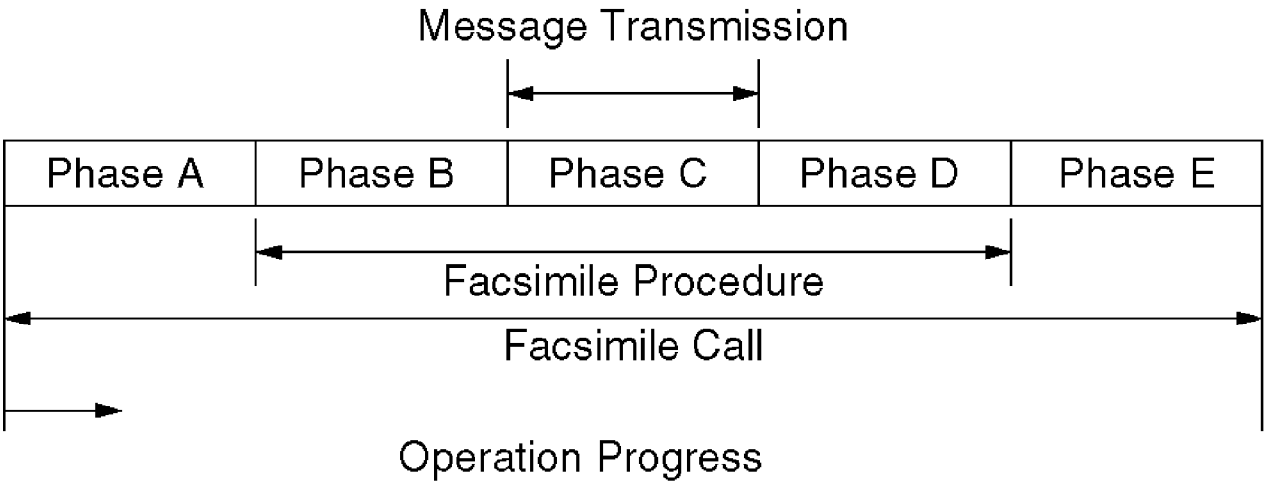
- **Group I (G1)**
  Official A-4 size documents without using formats which reduce the band width of a signal are sent over telephone lines. Determined in 1968.
  Transmission for about 6 minutes at a scanning line density of 3.85 lines/mm.
- **Group II (G2)**
  Using reduction technology in the modulation/demodulation format, an A-4 size

document is sent at an official scanning line density of 3.85 lines/mm for about 3 minutes.
Methods to suppress redundancy are not used.
Determined in 1976.

- **Group III (G3)**
  Method of suppressing redundancy in the image signal prior to modulation is used. An A-4 size document is sent within about one minute.
  Determined in 1980.

- **Group IV (G4)**
  Transmission is via the data network. A method is provided for suppressing redundancy in signals prior to transmission, and error-free reception of transmission is possible.
  The scope of these facsimile applications is not limited simply to transmission of written statements. Through symbiotic linkages with other communication methods, it can be expected to expand to include integrated services.

3. Facsimile Call Time Series
As shown in the following diagram, the facsimile call time series is divided into five phases.



Phase A : Call setting
Call setting can be manual/automatic.
Phase B : Pre-message procedure
Phase B is a pre-processing procedure and sequence for confirming the status of the terminal, transmission route, etc., and for terminal control. It implements terminal preparation status, determines and displays terminal constants, confirms

synchronization status, etc. and prepares for transmission of facsimile messages.
Phase C : Message transmission
Phase C is the procedure for the transmitting facsimile messages.
Phase D : Post message procedure
Phase D is the procedure for confirming that the message is completed and received. For continuous transmission, phase B or phase C is repeated for transmission.
Phase E : Call retrieval
Phase E is the procedure for call retrieval, that is for circuit disconnection.

4. Concerning Transmission Time
[Transmission Time] = [Control Time] + [Image Transmission Time] + [Hold Time]
Transmission time consists of the following.

Control time:
This is time at the start of transmission when the functions at the sending and receiving sides are confirmed, the transmission mode is established, and transmission and reception are synchronized.

Image transmission time:
This is the time required for the transmission of document contents (image data). In general, this time is recorded in the catalog, etc.

Hold time:
This is the time required after the document contents have been sent to confirm that the document was actually sent, and to check for telephone reservations and/ or the existence of continuous transmission.

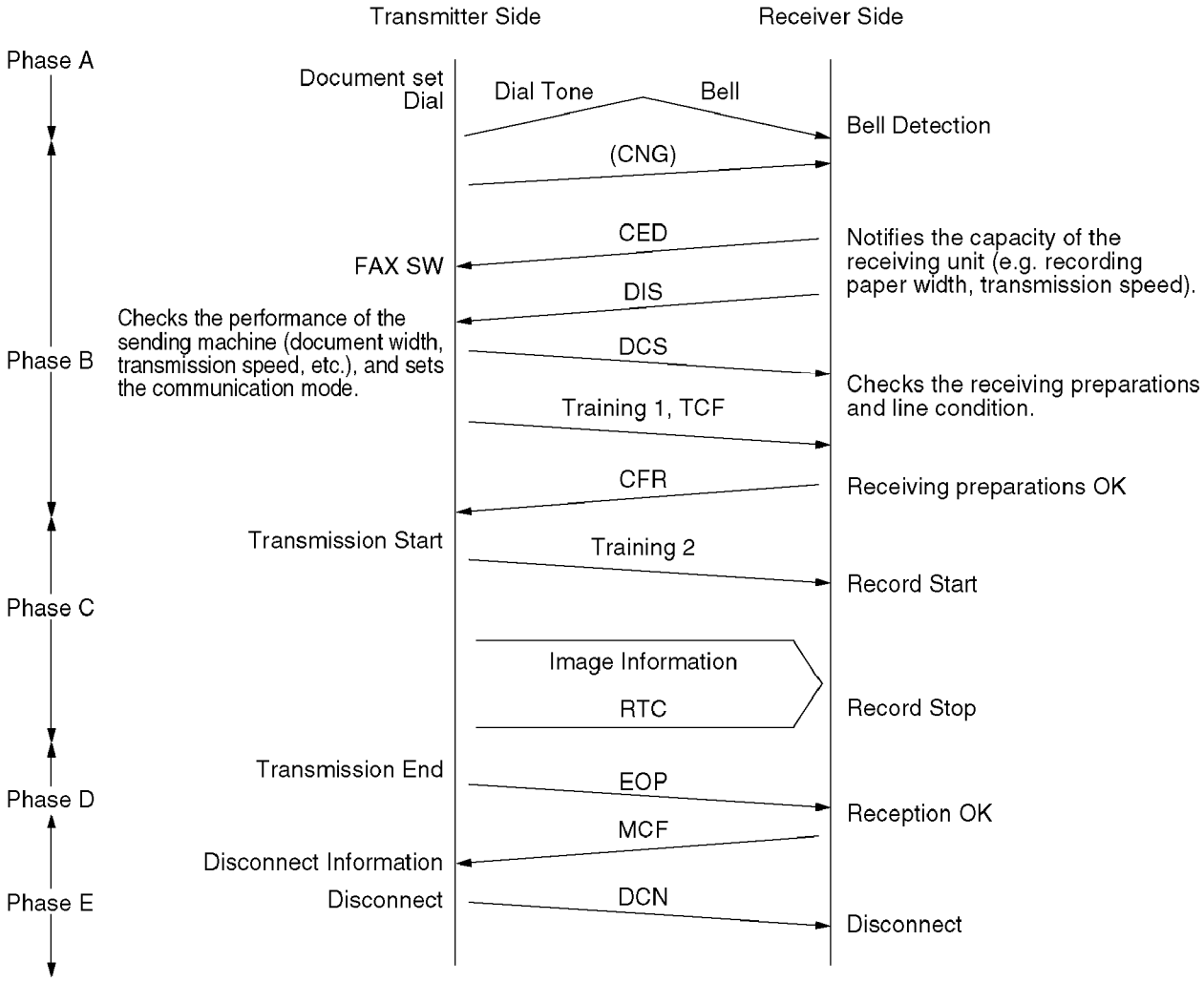
5. Facsimile Standards

Item	Telephone Network Facsimile G3 Machine
Connection Control Mode	Telephone Network Signal Mode
Terminal Control Mode	T. 30 Binary
Facsimile Signal Format	Digital
Modulation Mode	PSK (V. 27 ter) or QAM (V. 29)
Transmission Speed	300 bps (Control Signal) 2400, 4800, 7200, 9600 12000, 14400 bps (FAX Signal)
Redundancy Compression Process (Coding Mode)	1 dimension: MH Mode 2 dimension: MR Mode (K=2.4)
Resolution	Main Scan: 8 pel/mm Sub Scan: 3.85, 7.7l/mm
Line Synchronization Signal	EOL Signal
1 Line Transmission Time [ms/line]	Depends on the degree of data reduction. Minimum Value: 10, 20 Can be recognized in 40ms.

6. Explanation of Communication and Compression Technology

a. G3 Communication Signals (T. 30 Binary Process)

For G3 Facsimile communication, this is the procedure for exchanging control signals between the sending and receiving machines both before and after transmission of image signals.
Control signals at 300 bps FSK are: 1850 Hz...0, 1650Hz...1.
An example of a binary process in G3 communication is shown below.



Explanation of Signals

Control signals are comprised mainly of 8-bit identification signals and the data signals added to them. Data signals are added to DIS and DCS signals.

Signal.....DIS (Digital Identification Signal)

Identification Signal Format.....00000001

Function:

Notifies the capacity of the receiving unit. The added data signals are as follows.

Signal.....DCS (Digital Command Signal)

Identification Signal Format.....X1000001

Example (Some models do not support the following items.):

Bit No.	DIS/DTC	DCS
1	Transmitter --- T.2 operation	
2	Receiver --- T.2 operation	Receiver --- T.2 operation
3	T.2 IOC = 176	T.2 IOC = 176
4	Transmitter --- T.3 operation	
5	Receiver --- T.3 operation	Receiver --- T.3 operation
6	Reserved for future T.3 operation features	
7	Reserved for future T.3 operation features.	
8	Reserved for future T.3 operation features.	
9	Transmitter --- T.4 operation	
10	Receiver --- T.4 operation	Receiver --- T.4 operation
11, 12, 13, 14	Data signaling rate	Data signaling rate
0, 0, 0, 0	V.27 ter fall back mode	2400 bit/s, V.27 ter
0, 1, 0, 0	V.27 ter	4800 bit/s, V.27 ter
1, 0, 0, 0	V.29	9600 bit/s, V.29
1, 1, 0, 0	V.27 ter and V.29	7200 bit/s, V.29
0, 0, 1, 0	Not used	14400 bit/s, V.33
0, 1, 1, 0	Reserved	12000 bit/s, V.33
1, 0, 1, 0	Not used	Reserved
1, 1, 1, 0	V.27 ter and V.29 and V.33	Reserved
0, 0, 0, 1	Not used	14400 bit/s, V.17
0, 1, 0, 1	Reserved	12000 bit/s, V.17
1, 0, 0, 1	Not used	9600 bit/s, V.17
1, 1, 0, 1	V.27 ter and V.29 and V.33 and V.17	7200 bit/s, V.17
0, 0, 1, 1	Not used	Reserved
0, 1, 1, 1	Reserved	Reserved
1, 0, 1, 1	Not used	Reserved
1, 1, 1, 1	Reserved	Reserved
15	R8×7.7 lines/mm and/or 200×200 pels/ 25.4mm	R8×7.7 lines/mm and/or 200×200 pels/ 25.4mm
16	Two-dimensional coding capability	Two-dimensional coding capability

Bit No.	DIS/DTC	DCS
17, 18	Recording width capabilities	Recording width
(0, 0)	1728 picture elements along scan line length of 215 mm ± 1%	1728 picture elements along scan line length of 215 mm ± 1%
(0, 1)	1728 picture elements along scan line length of 215 mm ± 1% 2048 picture elements along scan line length of 255 mm ± 1%	2432 picture elements along scan line length of 303 mm ± 1%
(1, 0)	2432 picture elements along scan line length of 303 mm ± 1%	2048 picture elements along scan line length of 255 mm ± 1%
(1, 1)	1728 picture elements along scan line length of 215 mm ± 1% 2048 picture elements along scan line length of 255 mm ± 1% Invalid	Invalid
19, 20	Maximum recording length capability	Maximum recording length
(0, 0)	A4 (297 mm)	A4 (297 mm)
(0, 1)	Unlimited	Unlimited
(1, 0)	A4 (297 mm) and B4 (364 mm)	B4 (364 mm)
(1, 1)	Invalid	Invalid
21, 22, 23	Minimum scan line time capability of the receiver	Minimum scan line time
(0, 0, 0)	20 ms at 3.85 l/mm: $T_{7.7} = T_{3.85}$	20 ms
(0, 0, 1)	40 ms at 3.85 l/mm: $T_{7.7} = T_{3.85}$	40 ms
(0, 1, 0)	10 ms at 3.85 l/mm: $T_{7.7} = T_{3.85}$	10 ms
(1, 0, 0)	5 ms at 3.85 l/mm: $T_{7.7} = T_{3.85}$	5 ms
(0, 1, 1)	10 ms at 3.85 l/mm: $T_{7.7} = 1/2\ T_{3.85}$	
(1, 1, 0)	20 ms at 3.85 l/mm: $T_{7.7} = 1/2\ T_{3.85}$	
(1, 0, 1)	40 ms at 3.85 l/mm: $T_{7.7} = 1/2\ T_{3.85}$	
(1, 1, 1)	0 ms at 3.85 l/mm: $T_{7.7} = T_{3.85}$	0 ms
24	Extend field	Extend field
25	2400 bit/s handshaking	2400 bit/s handshaking
26	Uncompressed mode	Uncompressed mode
27	Error correction mode	Error correction mode
28	Set to "0".	Frame size 0 = 256 octets 1 = 64 octets
29	Error limiting mode	Error limiting mode
30	Reserved for G4 capability on PSTN	Reserved for G4 capability on PSTN

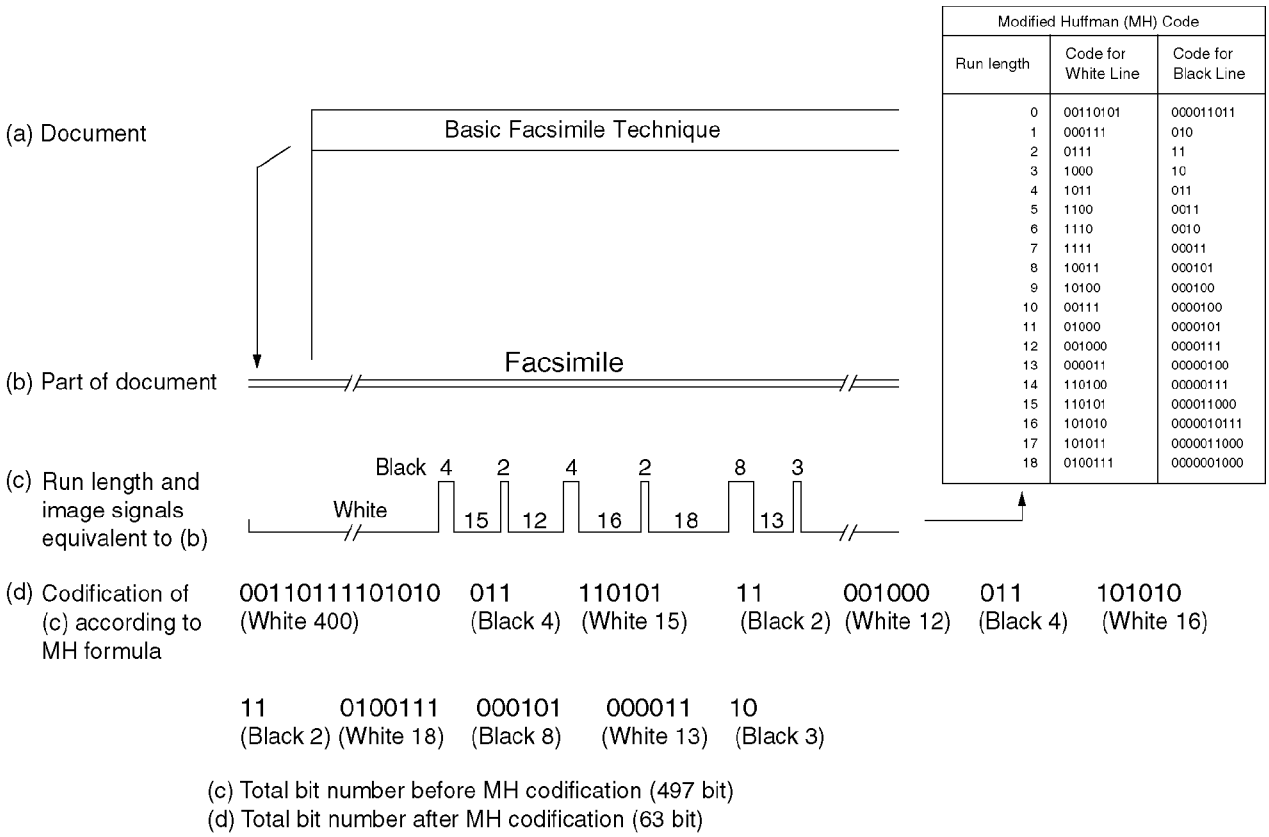
Bit No.	DIS/DTC	DCS
31	T.6 coding capability	T.6 coding enabled
32	Extend field	Extend field
33 (0) (1)	Validity of bits 17, 18 Bits 17, 18 are valid Bits 17, 18 are invalid	Recording width Recording width indicated by bits 17, 18 Recording width indicated by this field bit information
34	Recording width capability 1216 picture elements along scan line length of 151 ± mm 1%	Middle 1216 elements of 1728 picture elements
35	Recording width capability 864 picture elements along scan line length of 107 ± mm 1%	Middle 864 elements of 1728 picture elements
36	Recording width capability 1728 picture elements along scan line length of 151 ± mm 1%	Invalid
37	Recording width capability 1728 picture elements along scan line length of 107 ± mm 1%	Invalid
38	Reserved for future recording width capability.	
39	Reserved for future recording width capability.	
40	Extend field	Extend field
41	R8×15.4 lines/mm	R8×15.4 lines/mm
42	300×300 pels/25.4 mm	300×300 pels/25.4 mm
43	R16×15.4 lines/mm and/or 400×400 pels/25.4 mm	R16×15.4 lines/mm and/or 400×400 pels/ 25.4 mm
44	Inch based resolution preferred	Resolution type selection "0": neritic based resolution "1": inch based resolution
45	Metric based resolution preferred	Don’t care
46	Minimum scan line time capability for higher resolutions "0": $T_{15.4} = T_{7.7}$ "1": $T_{15.4} = 1/2T_{7.7}$	Don’t care
47	Selective Polling capability	Set to "0".
48	Extend field	Extend field

Note 1 - Standard facsimile units conforming to T.2 must have the following capability: Index of cooperation (IOC)=264.
Note 2 - Standard facsimile units conforming to T.3 must have the following capability: Index of cooperation (IOC)=264.
Note 3 - Standard facsimile units conforming to T.4 must have the following capability: Paper length=297 mm.

Signal	Identification Signal Format	Function
Training 1	————————	A fixed pattern is transmitted to the receiving side at a speed (2400 to 14400 bps) designated by DCS, and the receiving side optimizes the automatic equalizer, etc., according to this signal.
TCF (Training Check)	————————	Sends 0 continuously for 1.5 seconds at the same speed as the training signal.
CFR (Confirmation to Receive)	X0100001	Notifies the sending side that TCF has been properly received. If TCF is not properly received, FTT (Failure To Train) X0100010 is relayed to the sender. The sender then reduces the transmission speed by one stage and initiates training once again.
Training 2	————————	Used for reconfirming the receiving side like training 1.
Image Signal	Refer to the next page.	————————
RTC (Return to Control)	————————	Sends 12 bits (0...01 × 6 times) to the receiver at the same speed as the image signal and notifies completion of transmission of the first sheet.
EOP (End of Procedure)	X1110100	End of one communication
MCF (Message Confirmation)	X0110001	End of 1 page reception
DCN (Disconnect)	X1011111	Phase E starts.
MPS (Multi-Page Signal)	X1110010	Completion of transmission of 1 page. If there are still more documents to be sent, they are output instead of EOP. After MCF reception, the sender transmits an image signal of the second sheet.
PRI-EOP (Procedural Interrupt-EOP)	X1111100	If there is an operator call from the sender, it is output after RTC.
PIP (Procedural Interrupt Positive)	X0110101	This is output when an operator call is received.

b. Redundancy Compression Process Coding Mode

This unit uses one-dimensional MH format.


(a) Document
Basic Facsimile Technique
(b) Part of document
Facsimile
(c) Run length and image signals equivalent to (b)
Black 4 2 4 2 8 3
White 15 12 16 18 13
(d) Codification of (c) according to MH formula
00110111101010 (White 400)
011 (Black 4)
110101 (White 15)
11 (Black 2)
001000 (White 12)
011 (Black 4)
101010 (White 16)
11 (Black 2)
0100111 (White 18)
000101 (Black 8)
000011 (White 13)
10 (Black 3)
(c) Total bit number before MH codification (497 bit)
(d) Total bit number after MH codification (63 bit)

Modified Huffman (MH) Code

Run length	Code for White Line	Code for Black Line
0	00110101	000011011
1	000111	010
2	0111	11
3	1000	10
4	1011	011
5	1100	0011
6	1110	0010
7	1111	00011
8	10011	000101
9	10100	000100
10	00111	0000100
11	01000	0000101
12	001000	0000111
13	000011	00000100
14	110100	00000111
15	110101	000011000
16	101010	0000010111
17	101011	0000011000
18	0100111	0000001000

7.7. DESCRIPTION OF BLOCK DIAGRAM IN ANALOGUE SECTION

1. Function

The analogue section serves as an interface between the telephone line. The digital board (IC505) for transmission and reception of FAX signals, switches between the digital board (IC505) and other sections by means of a Analog SW (IC509) in the NCU section. The control signals to the individual analogue sections are output mainly from ASIC IC501, and the status information for the various sections is also held in ASIC IC501.

2. Circuit Operation

[NCU Section]

This is the interface between the telephone line and external telephone. This is composed of a bell detection circuit, pulse dial generation circuit, amplifier circuit for line transmission and reception, sidetone circuit, etc.

7.7.1. ANALOGUE UNIT BLOCK DIAGRAM

7.8. NCU SECTION

7.8.1. GENERAL

NCU is the interface with the telephone line. It is composed of Remote FAX activation circuit, Bell detection circuit, Pulse dial circuit, CPC detection circuit, Line amplifier and sidetone circuits. The following is a brief explanation of each circuit.

7.8.2. REMOTE FAX ACTIVATION CIRCUIT

1. Circuit Operation

After detecting the bell signal, another telephone connected to the same line switches to the FAX mode by DTMF signal.

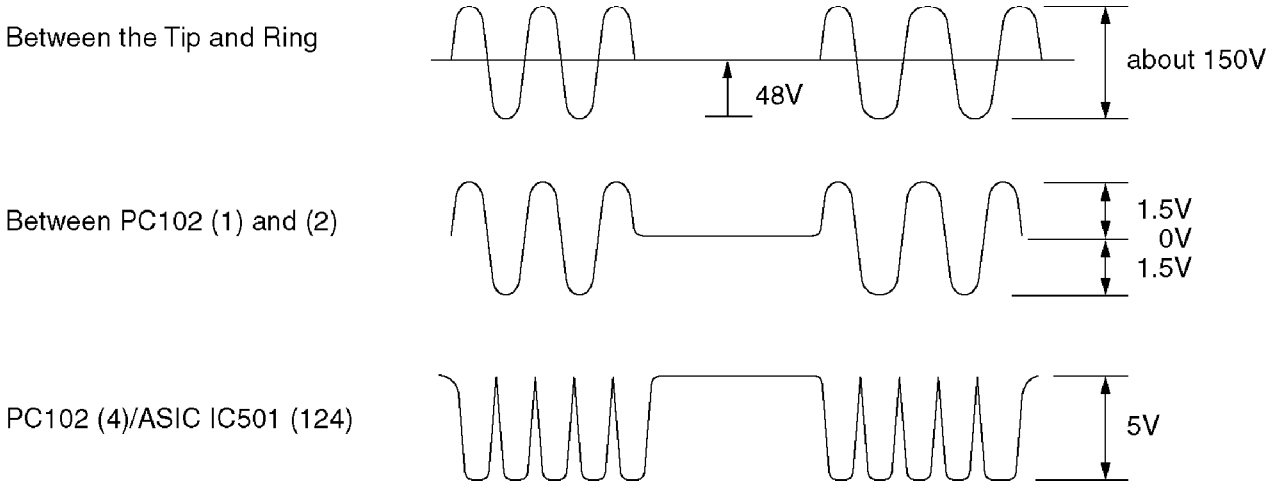
TEL LINE → T102 → C201 → R107 → IC101(6-7) → R213 → CN105(7) → {CN522(7) → C577 → R582 → IC505(62)}

{ }: Inside the Digital Board

7.8.3. BELL DETECTION CIRCUIT

1. Circuit Operation

The signal waveform for each section is indicated below. The signal (low level section) input to pin 124 of ASIC IC501 on the digital board is illustrated.



TEL LINE → PC102 (1, 2 → 4) → IC501 (124): Bell

7.8.4. PULSE DIAL CIRCUIT AND ON/OFF HOOK CIRCUIT

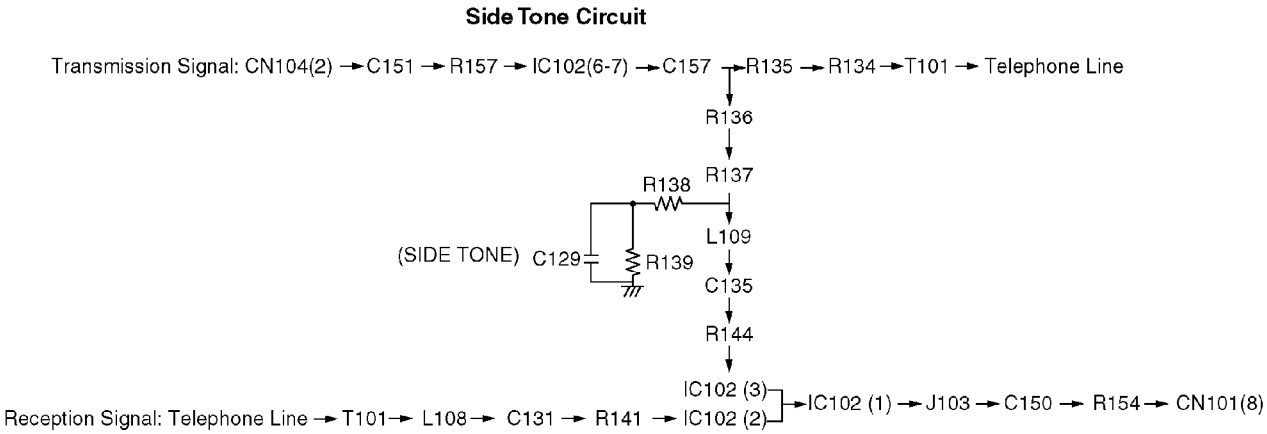
{IC519(15)} → HIGH LEVEL(MAKE) → Q101 ON (MAKE) → RL101 ON (MAKE) → TEL LINE
{IC519(15)} → LOW LEVEL(BREAK) → Q101 OFF (BREAK) → RL101 OFF (BREAK) → TEL LINE
{ }: Inside the Digital Board

7.8.5. LINE AMPLIFIER AND SIDE TONE CIRCUIT

1. Circuit Operation

The reception signal output from the line transformer T101 is input to pin (2) of IC102 via L108, C131 and R141 and then the signal is amplified at pin (1) of IC102 and sent to the reception system at 0dB.

The transmission signal goes through C151 and R157 and enters IC102-pin (6), where the signal is amplified to about 34.1dB. Then, it is output from pin (7) of IC102 and transmitted to T101 via C157, R135 and R134. If the side tone circuit is not applied, the transmission signal will return to the reception amplifier via L108, C131 and R141. When the side tone circuit is active, the signal output from IC102 pin (1) passes through R136, R137, L109, C135 and R144 and goes into the amplifier IC102 pin (3). This circuit is used to cancel the transmission return signal.



7.8.6. CPC (Calling Party Control) DETECTION CIRCUIT

1. Function

This circuit detects the signal (cuts the current) output from the converter when the other party finishes ICM recording and goes into the ON-HOOK status.

TAD detects this signal and disconnects the line. When the TAD is operating, pin (4) of PC101 becomes a low level.

While detecting the CPC signal, pin (4) of PC101 becomes a high level. When the CPC signal is detected, the TAD operation stops and the line is disconnected.

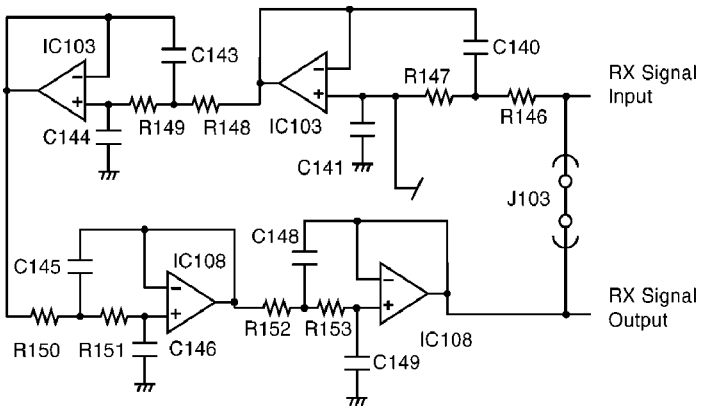
7.8.7. LOW PASS FILTER

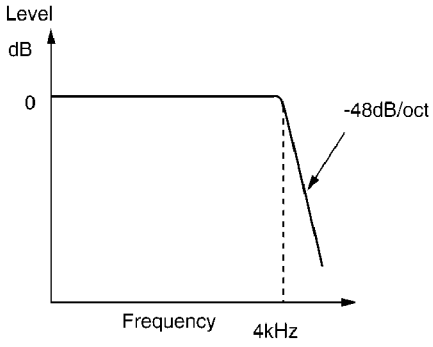
(1) Function

This low pass filter attenuates the 16-kHz account signal from the commutator to eliminate influence on conversation and communication.

(2) Circuit Operation

This low pass filter is an eight-order active filter, and the cutoff frequency is approximately 4 kHz.





7.8.8. CALLING LINE IDENTIFICATION CIRCUIT

1. Function

This unit is compatible with the Caller ID service offered by your local telephone company. To use this feature, you must subscribe to a Caller ID service. The data for the Caller ID from the telephone exchange is sent during the interval between the first and second rings of the bell signal. The data from the telephone exchange is a modem signal which is modulated in an FSK (Frequency Shift Keying) format. Data "0" is a 1300 Hz sine wave, and data 1 a 2100 Hz sine wave. There are two type of the message format which can be received:i.e.the single data message format and multiple data message format.

The multiple data format allows to transmit the name and data code information in addition to the time and telephone number data.

When there is multiple data in the unit, the name or telephone number are displayed.

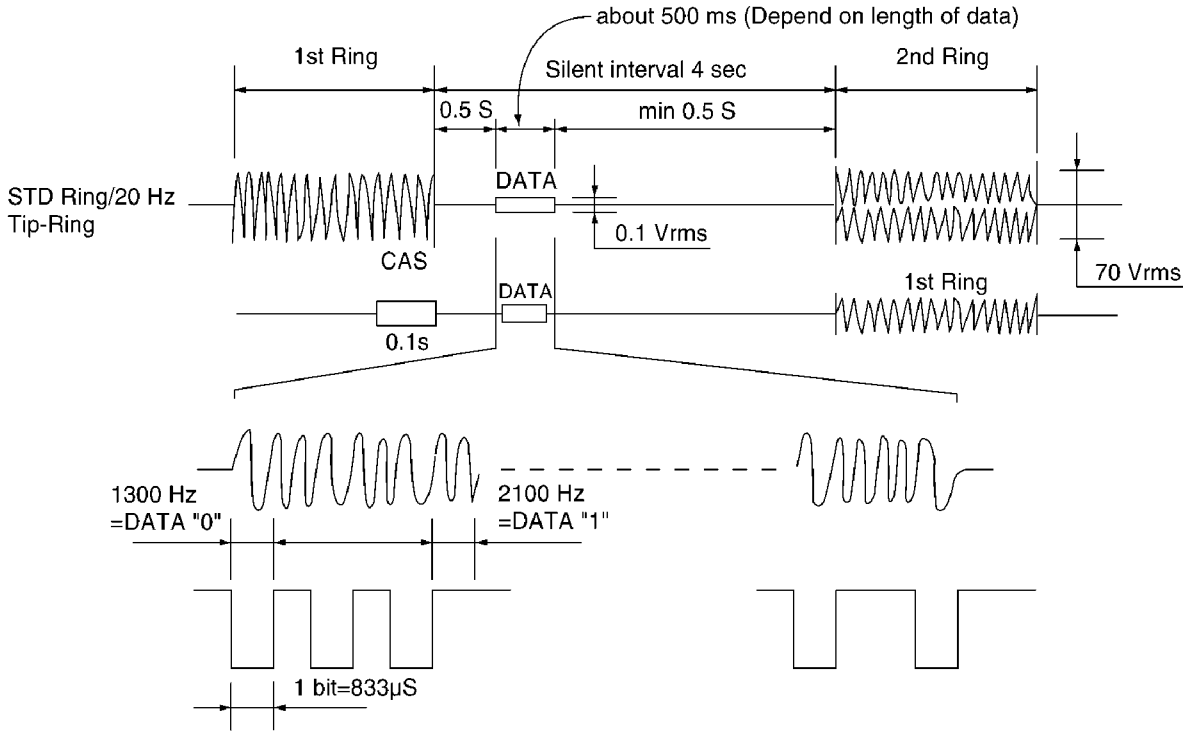
2. Circuit Operation:

The Caller ID signal input from TEL LINE is processed with MODEM (IC505).

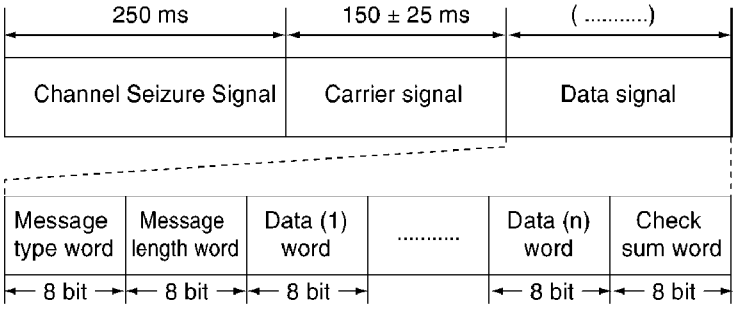
Refer to ANALOG BOARD SECTION (

) for the route of Caller ID signal.

Timing Chart

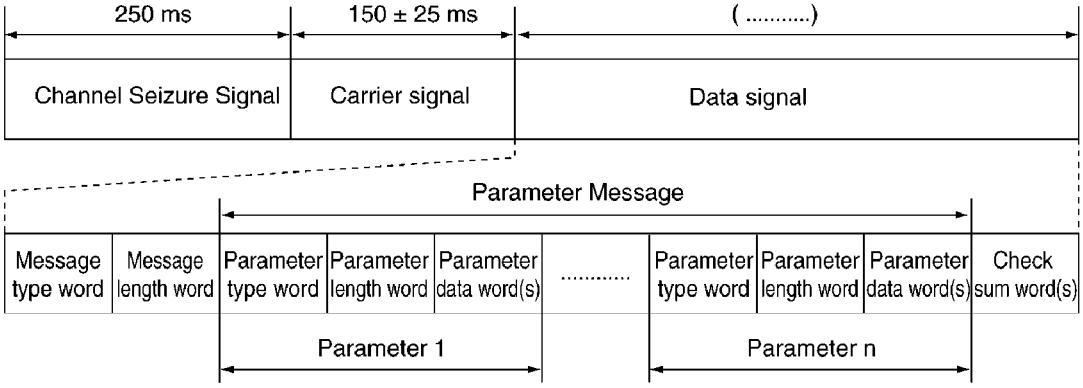


Single data message



- 1 word = All 8 bit data
- Message Type Word = Fixed value "00000100"
- Message Length Word = number of the data word
- Data word = The data value (month, day, hour, minute, telephone number)

· **Multiple data message**



·1 word = All 8 bit data
·Message Type = Fixed value "10000000"
·Message Length Word = number of the Parameter Message word
·Parameter Type Word = Kind of data (ex. the time, phone number)
·Parameter Length Word = number of the Parameter data word
·Parameter Word (s) = the data value

7.9. ITS (Integrated telephone System) and MONITOR SECTION

7.9.1. GENERAL

The general ITS operation is performed by the special IC505 which has a handset circuit. The alarm tone, the key tone, and the beep are output from the ASIC IC501 (digital board). During the pulse dial operation, the monitor tone is output from the ASIC IC501.

7.9.2. SPEAKER PHONE CIRCUIT

1. Function

The circuit controls the automatic switching of the transmitted and received signals, to and from the telephone line, when the unit is used in the hands-free mode.

2. Circuit Operation

The speakerphone can only provide duplex.

3. Signal path

Refer to Check Sheet for Signal Route( ).

7.9.3. HANDSET CIRCUIT

1. Function

This circuit controls the conversation over the handset, i.e. the transmitted and received voices to and from the handset.

2. Signal path

Refer to Check Sheet for Signal Route( ).

7.9.4. MONITOR CIRCUIT FOR EACH SIGNALS

1. Function

This circuit monitors various tones, such as 1 DTMF tone, 2 Alarm/Beep/Key tone/Bell 3 Dummy ring back tone.

2. Signal path

Refer to Check Sheet for Signal Route( ).

7.10. ATAS (Automatic Telephone Answering System) SECTION

1. Function

The ATAS main operation is performed by the special IC505 (MODEM). IC512 (FLASH MEMORY)'s control signals are input from ASIC IC501.

A. Greeting/Message Recording
B. ICM Recording
C. Greeting/Message/ICM play to speaker
D. Greeting/Message/ICM play to Tel Line
E. Vox Detection

2. Signal Path

Refer to Check Sheet for Signal Route( ).

7.11. OPERATION BOARD SECTION

The unit consists of a LCD (Liquid crystal display), KEYs and LEDs (light-emitting diodes). They are controlled by the Gate Array (IC301) and ASIC (IC501: on the

DIGITAL BOARD). (Fig.-a)
The key matrix table is shown below.

Key Matrix

	KIN0	KIN1	KIN2	KIN3	KIN4	KIN5	KIN6	KIN7
KSL0	SW301 RECORD			SW312 1	SW317 2	SW322 3		
KSL1	SW302 ERASE	SW305 (+)	SW309 HELP	SW313 4	SW318 5	SW323 6		
KSL2	SW303 PLAY MESSAGES	SW306 →		SW314 7	SW319 8	SW324 9	SW327 FAX/START	SW330 CALLER-ID
KSL3		SW307 SP-PHONE / MONITOR	SW310 (—)	SW315 FLASH	SW320 REDIAL/PAUSE	SW325 MUTE	SW328 COPY	SW331 BROAD CAST
KSL4	SW304 AUTO ANSWER	SW308 MEMU	SW311 ←	SW316 *	SW321 0	SW326 #	SW329 STOP	

XL

	XL12	XL11
	DOCUMENT SET	DOCUMENT TOP

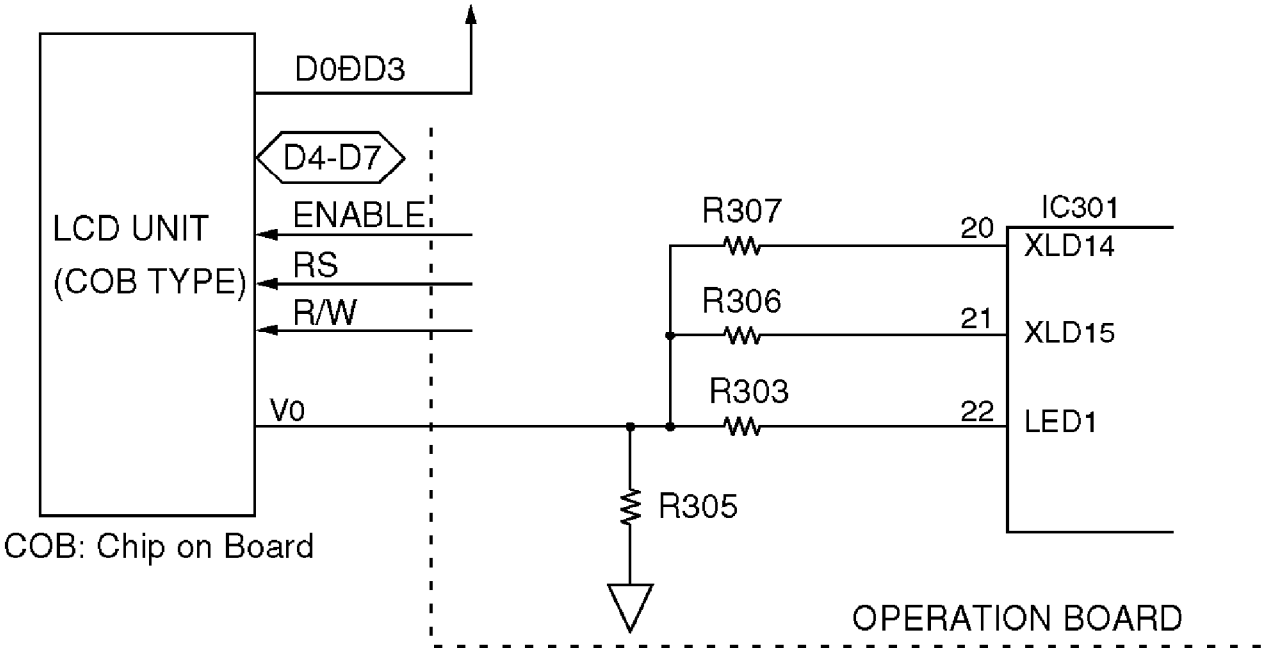
LED

LED2	LED3	LED4
AUTO ANSWER		

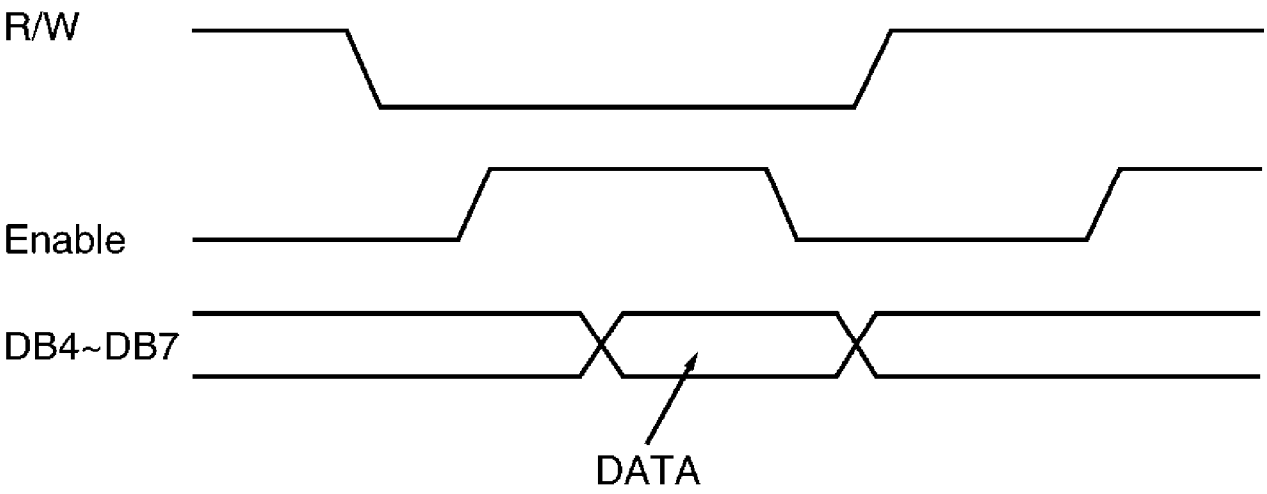
7.12. LCD SECTION

The Gate Array (IC301) works only for writing the ASCII code from the data bus (D4~D7). V0 is supplied for the crystal drive.
R303, R305, R306 and R307 are density control resistors.
Consequently, in this unit, the timing (positive clock) is generated by the LCD interface circuitry in the gate array (IC301).

Circuit Diagram



Timing Chart

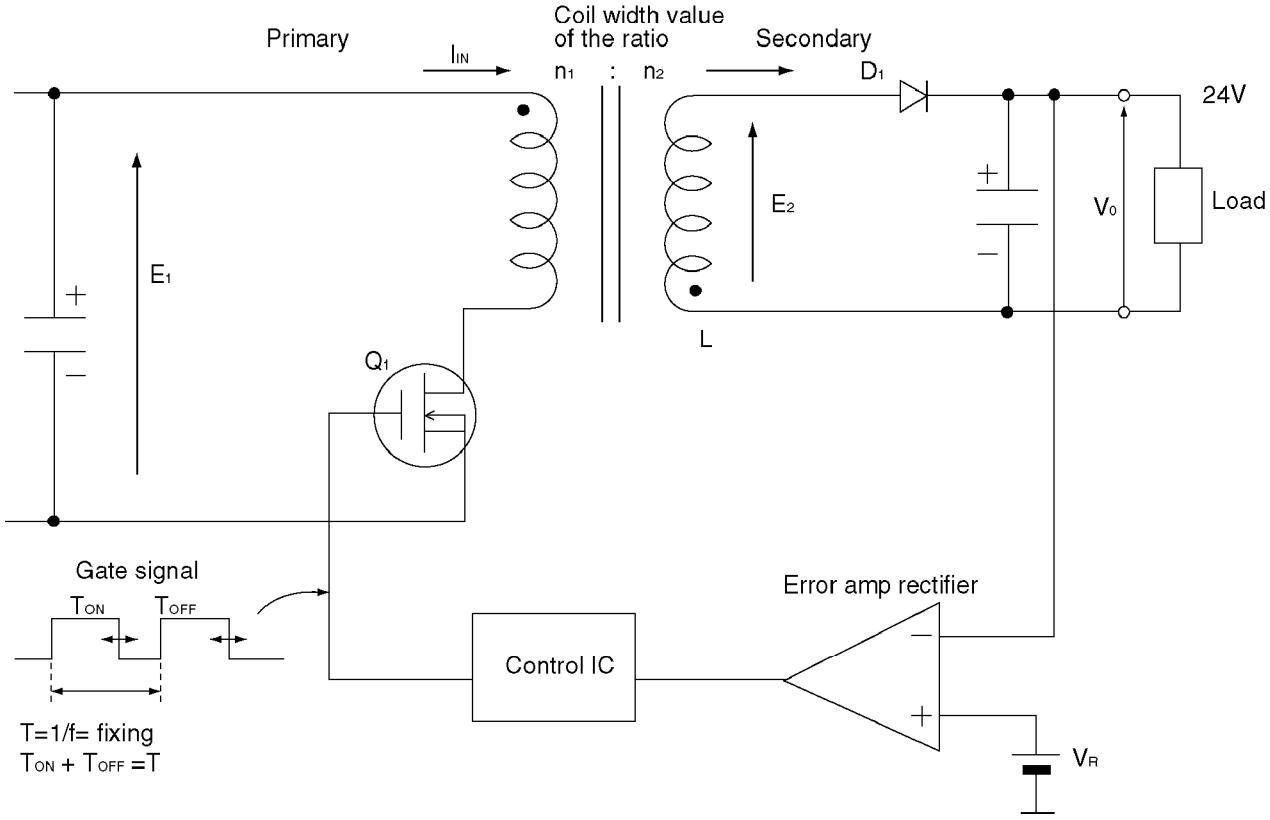


DIsplay mode	Density	Normal	Dark
2 lines (X1. 0)	LED1 (IC301-22pin)	H	L
	LED15 (IC301-21pin)	L	L
	LED14 (IC301-20pin)	Hi-Z	L
X1. 5	LED1	H	H
	LED15	Hi-Z	L
	LED14	Hi-Z	Hi-Z

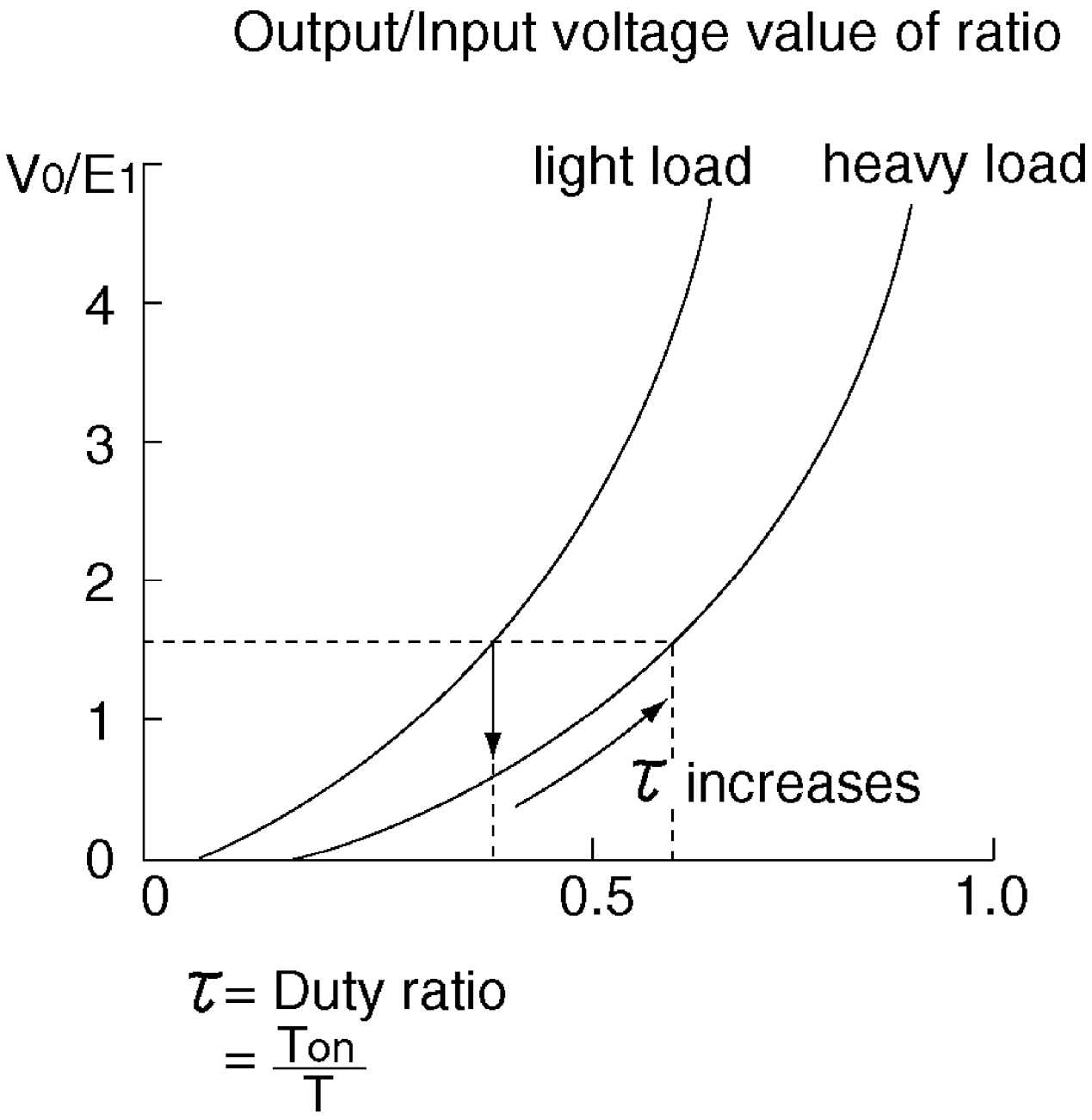
7.13. POWER SUPPLY BOARD SECTION

This power supply board uses the switching regulator method.

[Input Circuit]
The input current goes into the input rectifier circuit through the filter circuit. The filter circuit decreases the noise voltage and the noise electric field strength.
[Rectifier Circuit]
The input current is rectified by D101,D102,D103 and D104 and charges C106 to make DC voltage. Then it supplies power to the converter circuit.
[Kick-on voltage circuit]
Bias is applied to the Q101 gate via this circuit when the AC power is turned on and Q101 begins operating.



The following is an overview of how the power supply unit is controlled.
The control method of this power supply unit is pulse width modulation.
When Q_1 is ON, the energy is charged in the transfer primary coil according to E_1.
When Q_1 is OFF, the energy is output from the secondary transfer as follows.
L → D_1 → Load → L
Then the power is supplied to the Load. When Q_1 is ON, power is not output from the secondary side. The output voltage is fed back in the control IC according to the error amp rectifier. Then depending on how T_{ON} is controlled, stabilization occurs. Also, when the current load becomes too large, in order to decrease the voltage output, the increase in τ is controlled and the output voltage is stabilized.
Therefore, basically the timing: Ton/Toff of Q1 controls the output voltage.

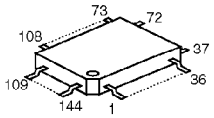
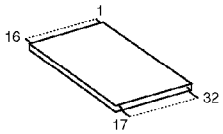
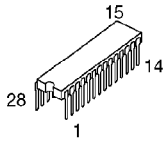
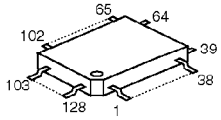
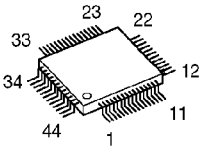
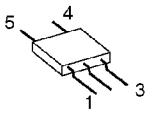
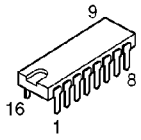
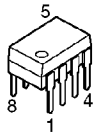
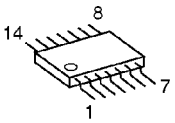
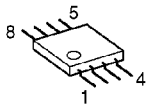
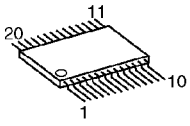
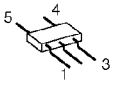
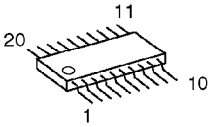
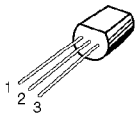
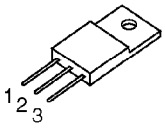
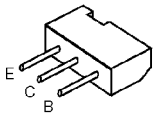
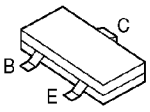
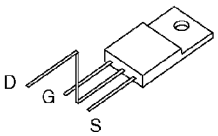
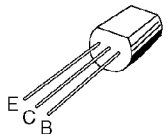
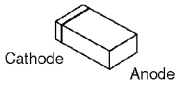
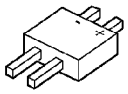
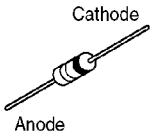
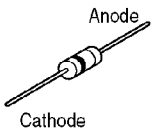
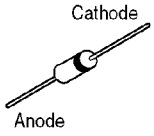
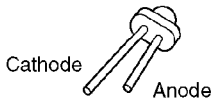


[Surge Absorber Circuit]
This circuit is for absorbing surge voltage generated by the transformer.
[Control Circuit and Detecting Circuit]
The control circuit amplifies the output with increased voltage detected in the error detecting circuit. Then it drives the main transistor.
In this power supply, the duty ratio is defined by changing the ON period of the main transistor.
This is shown as follows.

When the output voltage of the 24V circuit increases, the current of the photo coupler PC101 increases, the pulse width of the output control IC becomes narrower and the ON period of Q101 becomes shorter.
[Over Current Limiter (O.C.L)]
The highest drain current (Q101) is limited by a limiter circuit (IC101) of 24V. The 24V output is limited by this circuit.
[Over Voltage Circuit]
If the 24V output increases because the error detecting circuit or control circuit is broken, IC101 will recognize this signal and output becomes 0V.
Dummy load method (to quickly check the power supply output)
Refer to POWER SUPPLY BOARD SECTION(
).

8. REFERENCE MATERIALS DATA

8.1. TERMINAL GUIDE OF THE ICs TRANSISTORS AND DIODES

 C1ZBZ0001896	 PFWIFP145G C3FAKC000008	 C3ABKC000027	 PFVIR675813	 C1ZBZ0002089
 PFVII5510011	 PFVIT2003APS	 PFVIKA7552	 PQVITC4066BF	 PQVINJM2904F PQVIMC34119M C0AABB000025, PFVTSI4431DY PFVIPC4082T2, PFVINJM2904M
 PFVITVT245FT	 PQVITC7S08FU	 PQVIMC7H374F	 AN1431T	 PFVITA7805F
 2SB1322	 PQVTDTC143E PQVTDTC114EU 2SD1819A 2SB1197KQ	 2SK2717	 2SC2235	 MA143
 PFVDDGS1ZB60	 PFVDRMRLS245 MA4056, MA4047	 MA7160	 1SS119	 LNJ801LPDJA

8.2. HOW TO REPLACE THE FLAT PACKAGE IC

Even if you do not have the special tools (for example, a spot heater) to remove the Flat IC, with some solder (large amount), a soldering iron and a cutter knife, you can easily remove the ICs that have more than 100 pins.

8.2.1. PREPARATION

8.2.1.1. For Power Supply Board

- **SOLDER**
  Sparkle Solder 115A-1, 115B-1 OR Almit Solder KR-19, KR-19RMA
- **Soldering iron**
  Recommended power consumption is between 30 W to 40 W.
  Temperature of Copper Rod 662 ± 50°F (350 ± 10°C)
  (An expert may handle a 60~80 W iron, but a beginner might damage the foil by overheating.)
- **Flux**
  HI115 Specific gravity 0.863
  (Original flux should be replaced daily.)

8.2.1.2. For P.C.Board with "PbF" marking

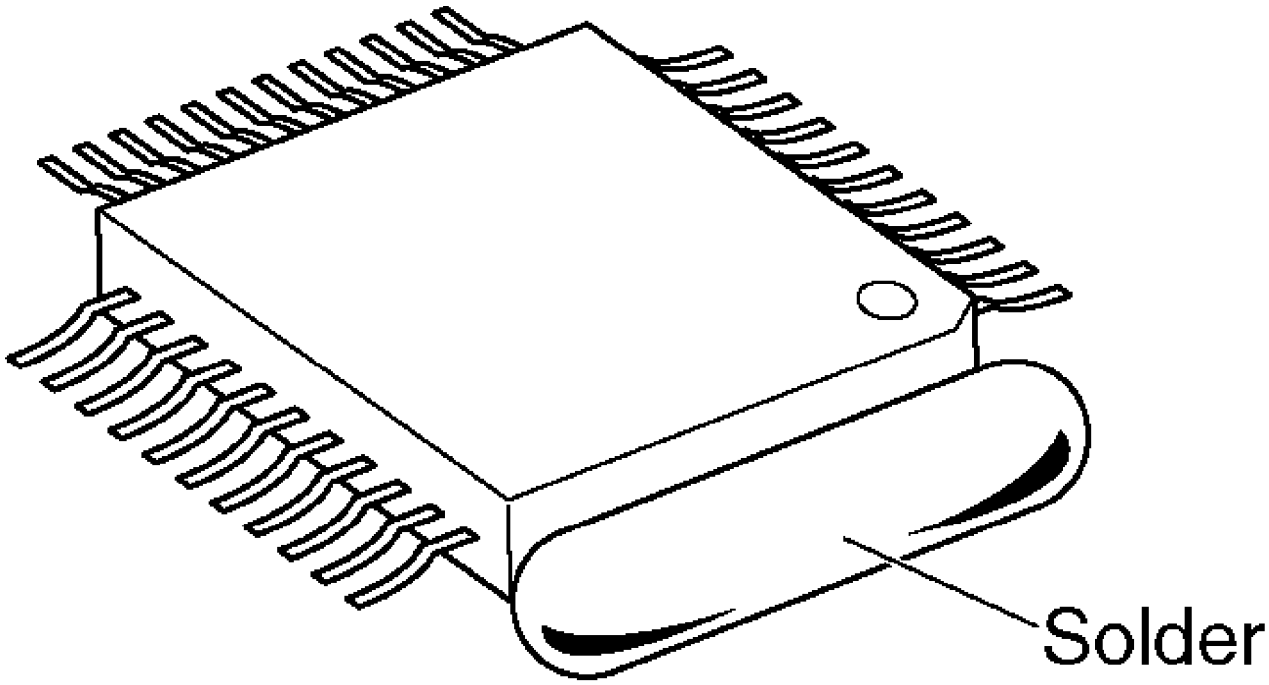
- **PbF (: Pb free) Solder**
- **Soldering Iron**
  Tip Temperature of 700°F ± 20°F (370°C ± 10°C)
  Note: We recommend a 30 to 40 Watt soldering iron. An expert may be able to use a 60 to 80 Watt iron where someone with less experience could overheat and damage the PCB foil.
- **Flux**
  Recommended Flux: Specific Gravity → 0.82.
  Type → RMA (lower residue, non-cleaning type)

Note: See ABOUT LEAD FREE SOLDER (PbF: Pb free) (
).

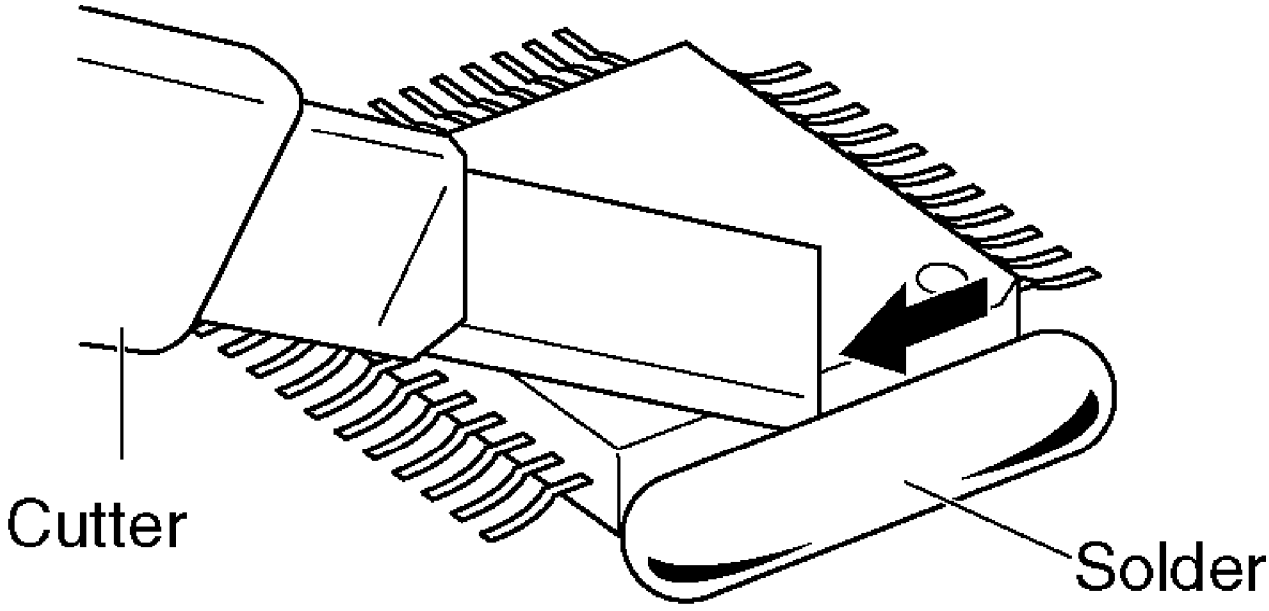
8.2.2. FLAT PACKAGE IC REMOVAL PROCEDURE

1. Put plenty of solder on the IC pins so that the pins can be completely covered.

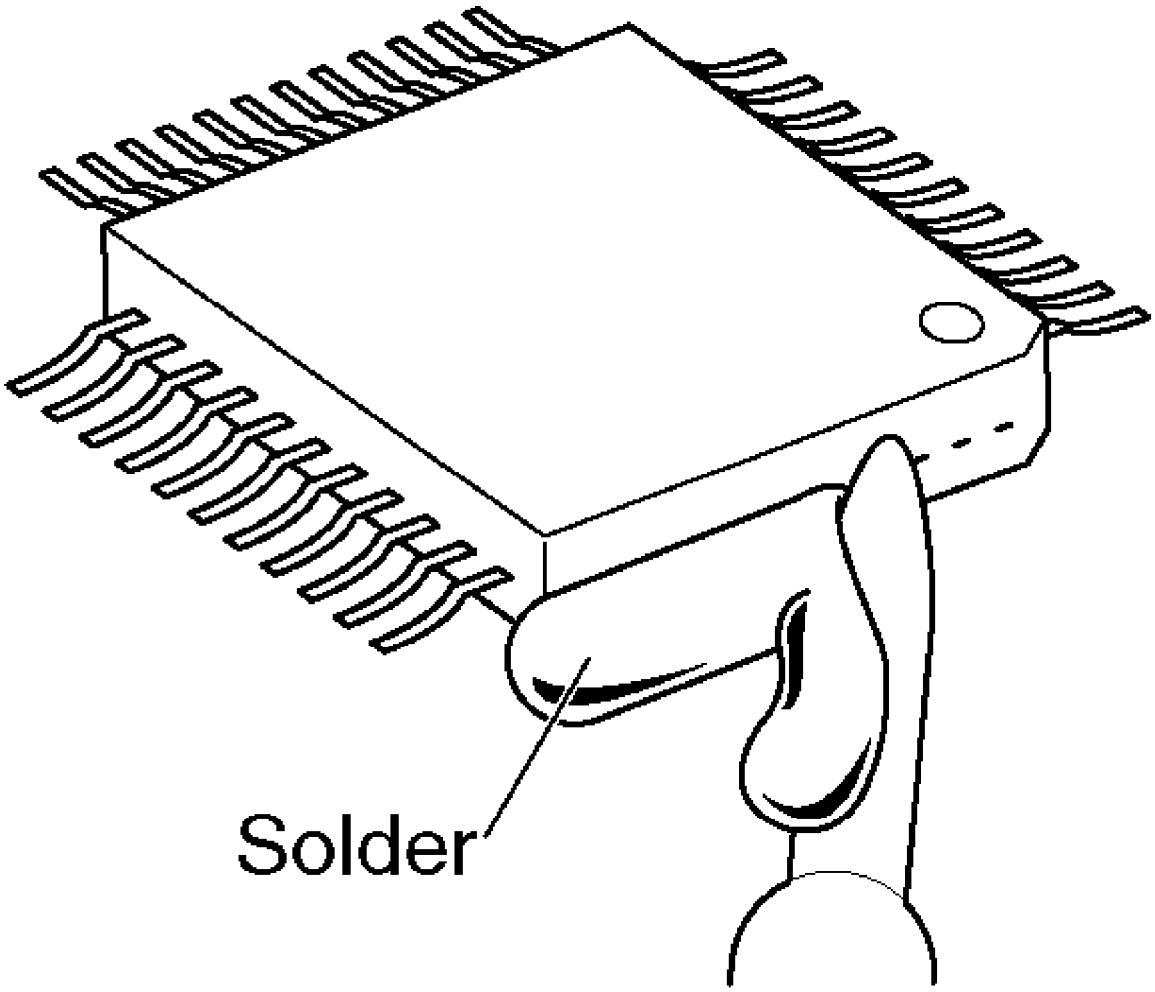
Note:
If the IC pins are not soldered enough, you may give pressure to the P.C. board when cutting the pins with a cutter.



2. Make a few cuts into the joint (between the IC and its pins) first and then cut off the pins thoroughly.



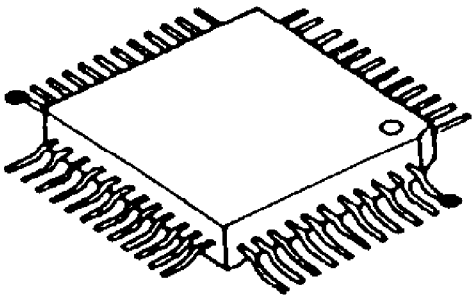
3. While the solder melts, remove it together with the IC pins.



When you attach a new IC to the board, remove all solder left on the land with some tools like a soldering wire. If some solder is left at the joint on the board, the new IC will not be attached properly.

8.2.3. FLAT PACKAGE IC INSTALLATION PROCEDURE

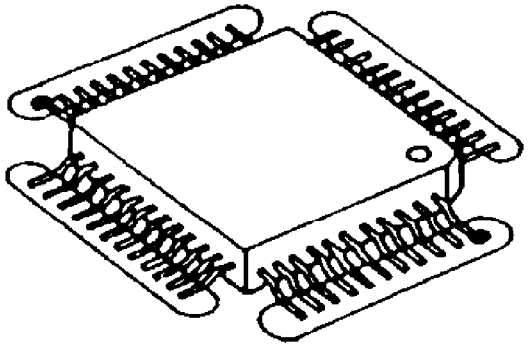
1. Temporarily fix the FLAT PACKAGE IC, soldering the two marked pins.



● – – – – – – Temporary soldering point.

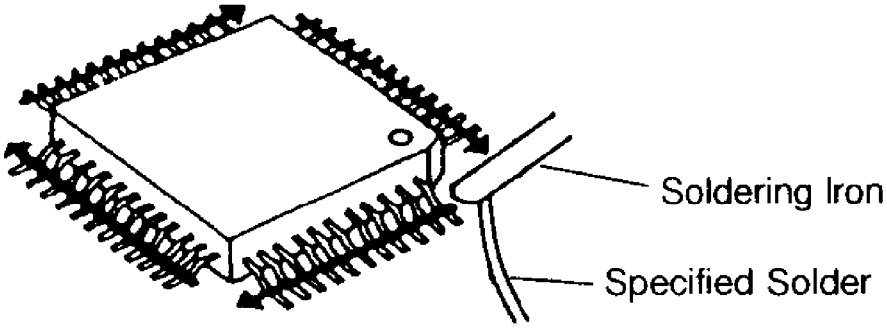
***Check the accuracy of the IC setting with the corresponding soldering foil.**

2. Apply flux to all pins of the FLAT PACKAGE IC.



– – – – – Flux

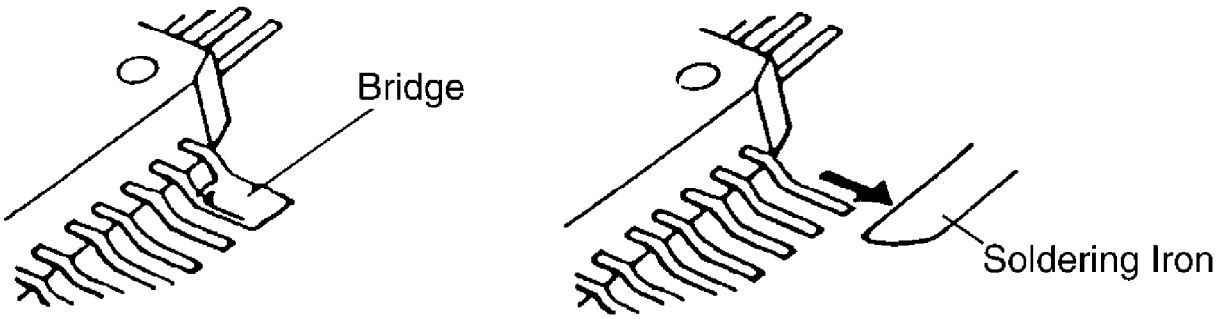
3. Solder the pins, sliding the soldering iron in the direction of the arrow.



8.2.4. BRIDGE MODIFICATION PROCEDURE

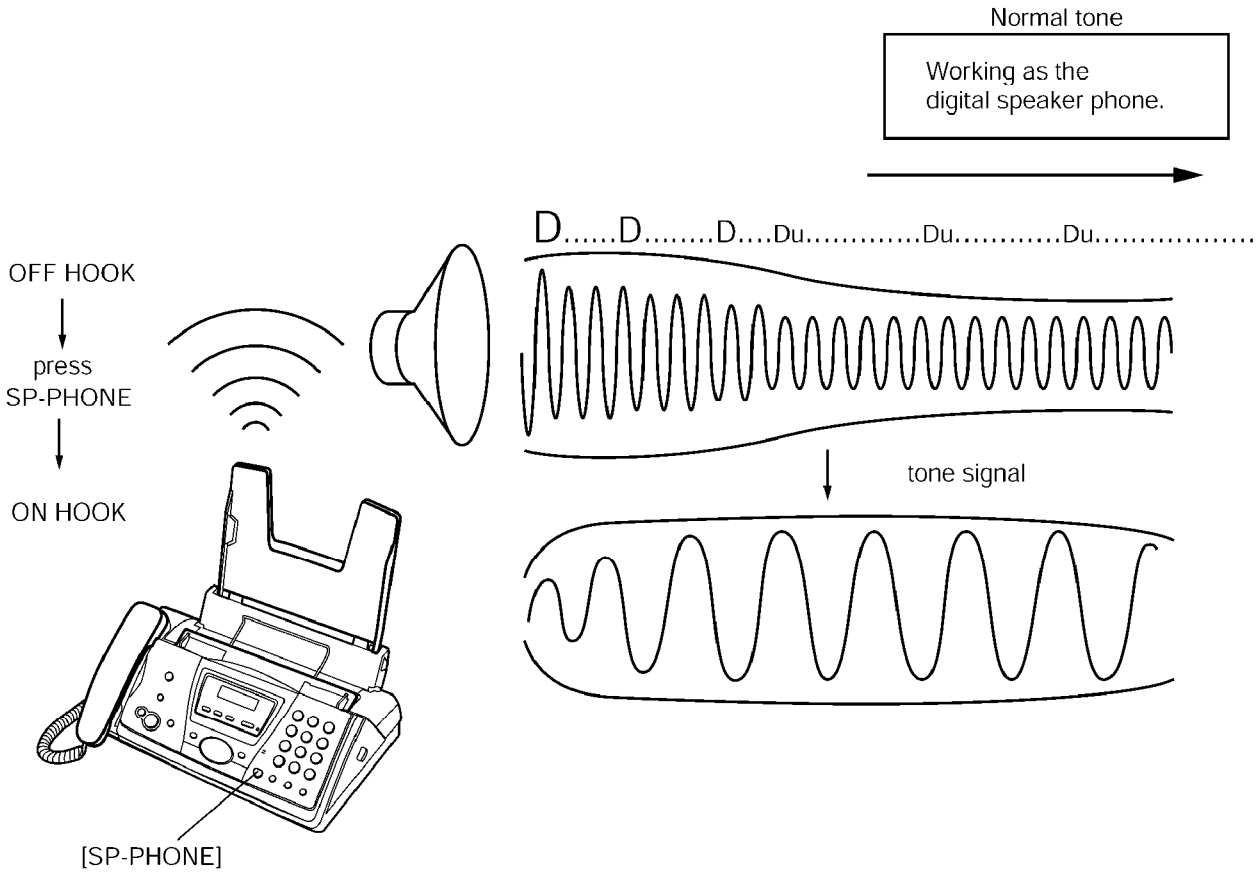
1. Lightly resolder the bridged portion.

2. Remove the remaining solder along the pins using a soldering iron as shown in the figure below.

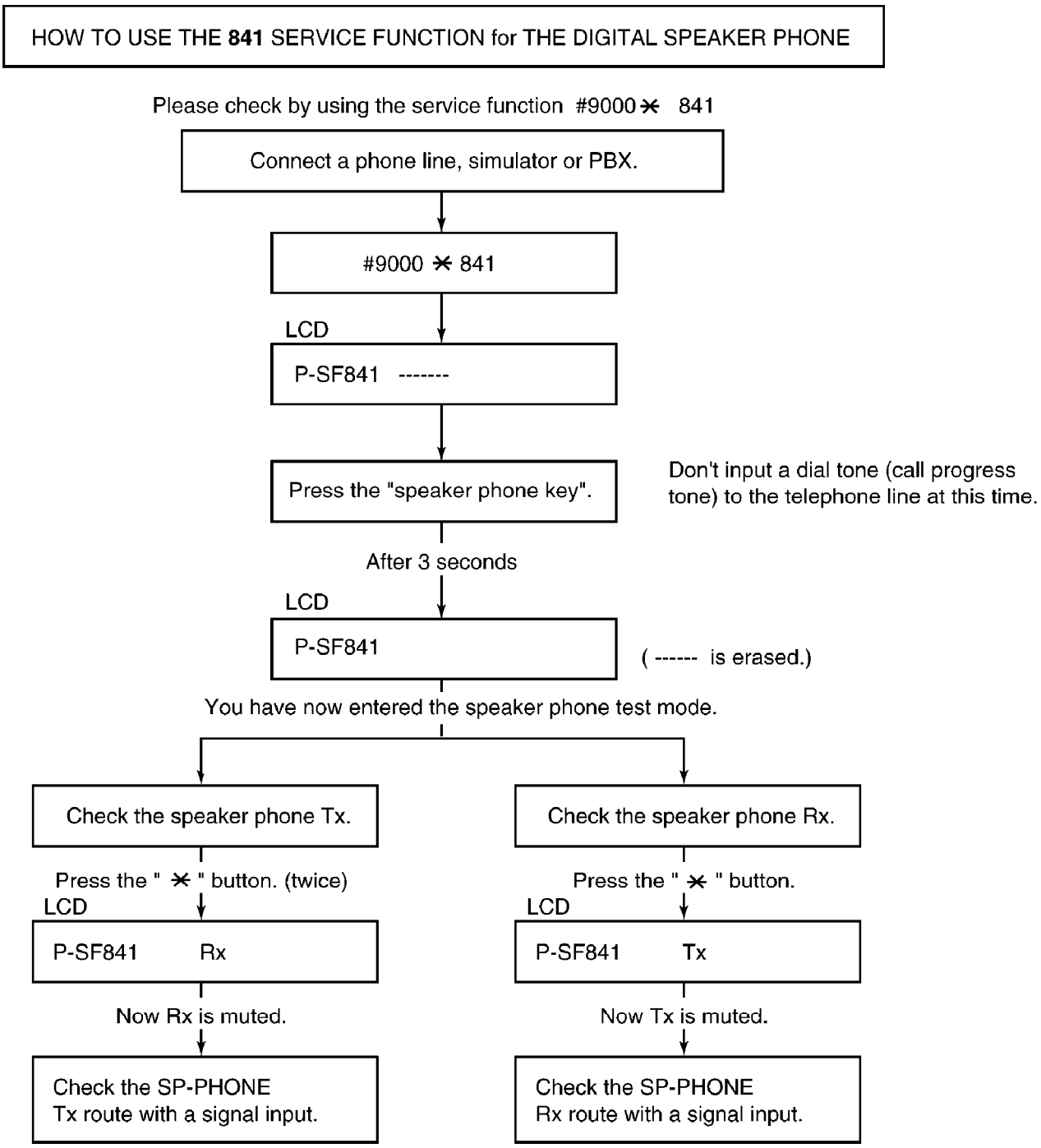


8.3. DIGITAL SPEAKERPHONE

The digital speakerphone has different features from the analog speakerphone. The analog speakerphone switches between Tx or Rx. Either Tx or Rx is able to pass through a telephone line or speaker, depending on the Tx and Rx signal (voice) level. The higher-level signal (either TX or RX) can pass through the route. Therefore, you never hear the other party's voice while you are talking. However, the digital speakerphone allows you to hear the other party's voice while you are talking. So both Tx and Rx are active at the same time. There is also a difference in the troubleshooting procedures between the two types.
At the start of communication, during the initial 2~3 correspondences, the digital speakerphone performs half-duplex operation, alternating between transmission (Tx) and reception (Rx). Then duplex communication becomes available.
Learning occurs during the initial 2~3 correspondences in order to set the appropriate parameters for duplex communication.



You cannot check the digital speaker phone by the signal route test mentioned in the Analog Board Section because the level is always changing as stated above. Therefore, there is a service function for this troubleshooting. In this service mode, you can set the mute to either Tx or Rx. Then you can check the signal route of the speaker phone Tx or the speaker phone Rx without any disturbances.


HOW TO USE THE 841 SERVICE FUNCTION for THE DIGITAL SPEAKER PHONE
Please check by using the service function #9000 ✳ 841
Connect a phone line, simulator or PBX.
#9000 ✳ 841
LCD
P-SF841 -------
Press the "speaker phone key".
Don't input a dial tone (call progress tone) to the telephone line at this time.
After 3 seconds
LCD
P-SF841
(------ is erased.)
You have now entered the speaker phone test mode.
Check the speaker phone Tx.
Press the " ✳ " button. (twice)
LCD
P-SF841 Rx
Now Rx is muted.
Check the SP-PHONE Tx route with a signal input.
Check the speaker phone Rx.
Press the " ✳ " button.
LCD
P-SF841 Tx
Now Tx is muted.
Check the SP-PHONE Rx route with a signal input.

Note:

Check to the SP-Phone Rx/Tx signal routes. (Refer to Check Sheet for Signal Route ( )).

8.4. MODEM SECTION

8.4.1. FUNCTION

The unit uses a 1 chip modem (IC505) that serves as an interface between the control section for FAX transmission and reception and the telephone line. During a transmitting operation, the digital image signals are modulated and sent to the telephone line.
During a receiving operation, the analogue image signals which are received via the telephone line are demodulated and converted into digital image signals. The communication format and procedures for FAX communication are standardized by ITU-T. This 1 chip modem (IC505) has hardware which sends and detects all of the necessary signals for FAX communication.
It can be controlled by writing commands from the CPU (IC501: inside ASIC) to the register in the modem (IC505).
This modem (IC505) also sends DTMF signals, generates a call tone (from the speaker), and detects a busy tone and dial tones.
Overview of Facsimile Communication Procedures (ITU-T Recommendation):

1. ON CCITT (International Telegraph and Telephone Consultative Committee)
The No. XIV Group of CCITT, one of the four permanent organizations of the International Telecommunications Union (ITU), investigates and make recommendations on international standards for facsimiles.

2. Definition of Each Group

- **Group I (G1)**
  Official A-4 size documents without using formats which reduce the band width of a signal are sent over telephone lines. Determined in 1968.
  Transmission for about 6 minutes at a scanning line density of 3.85 lines/mm.
- **Group II (G2)**
  Using reduction technology in the modulation/demodulation format, an A-4 size document is sent at an official scanning line density of 3.85 lines/mm for about 3 minutes.
  Methods to suppress redundancy are not used.

Determined in 1976.

- **Group III (G3)**

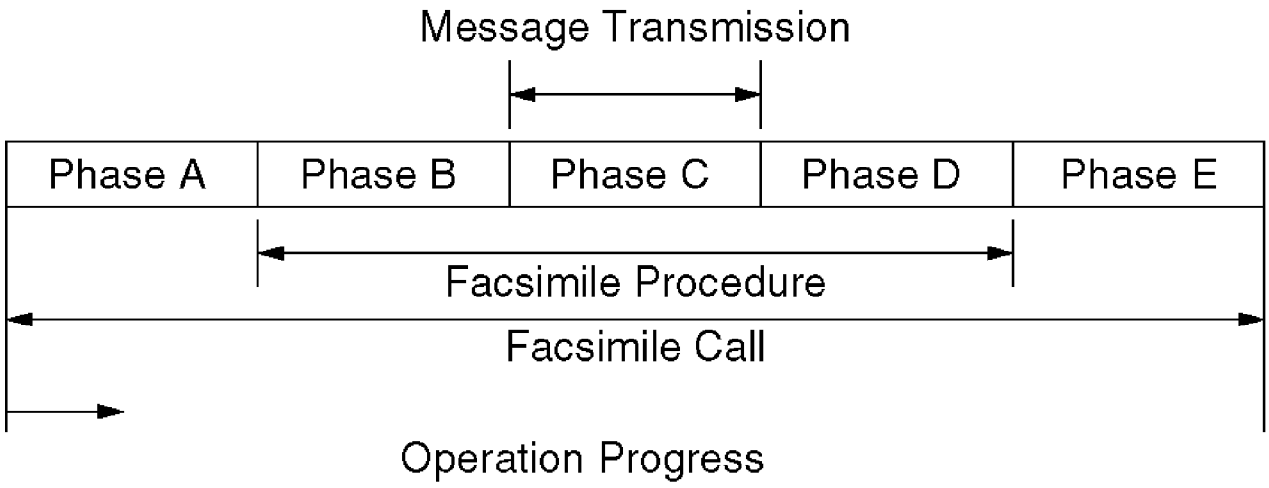
  Method of suppressing redundancy in the image signal prior to modulation is used. An A-4 size document is sent within about one minute.
  Determined in 1980.

- **Group IV (G4)**

  Transmission is via the data network. A method is provided for suppressing redundancy in signals prior to transmission, and error-free reception of transmission is possible.
  The scope of these facsimile applications is not limited simply to transmission of written statements. Through symbiotic linkages with other communication methods, it can be expected to expand to include integrated services.

3. Facsimile Call Time Series

As shown in the following diagram, the facsimile call time series is divided into five phases.



Phase A : Call setting

Call setting can be manual/automatic.

Phase B : Pre-message procedure

Phase B is a pre-processing procedure and sequence for confirming the status of the terminal, transmission route, etc., and for terminal control. It implements terminal preparation status, determines and displays terminal constants, confirms synchronization status, etc. and prepares for transmission of facsimile messages.

Phase C : Message transmission

Phase C is the procedure for the transmitting facsimile messages.

Phase D : Post message procedure
Phase D is the procedure for confirming that the message is completed and received. For continuous transmission, phase B or phase C is repeated for transmission.
Phase E : Call retrieval
Phase E is the procedure for call retrieval, that is for circuit disconnection.

4. Concerning Transmission Time
[Transmission Time] = [Control Time] + [Image Transmission Time] + [Hold Time]
Transmission time consists of the following.

Control time:
This is time at the start of transmission when the functions at the sending and receiving sides are confirmed, the transmission mode is established, and transmission and reception are synchronized.

Image transmission time:
This is the time required for the transmission of document contents (image data). In general, this time is recorded in the catalog, etc.

Hold time:
This is the time required after the document contents have been sent to confirm that the document was actually sent, and to check for telephone reservations and/ or the existence of continuous transmission.

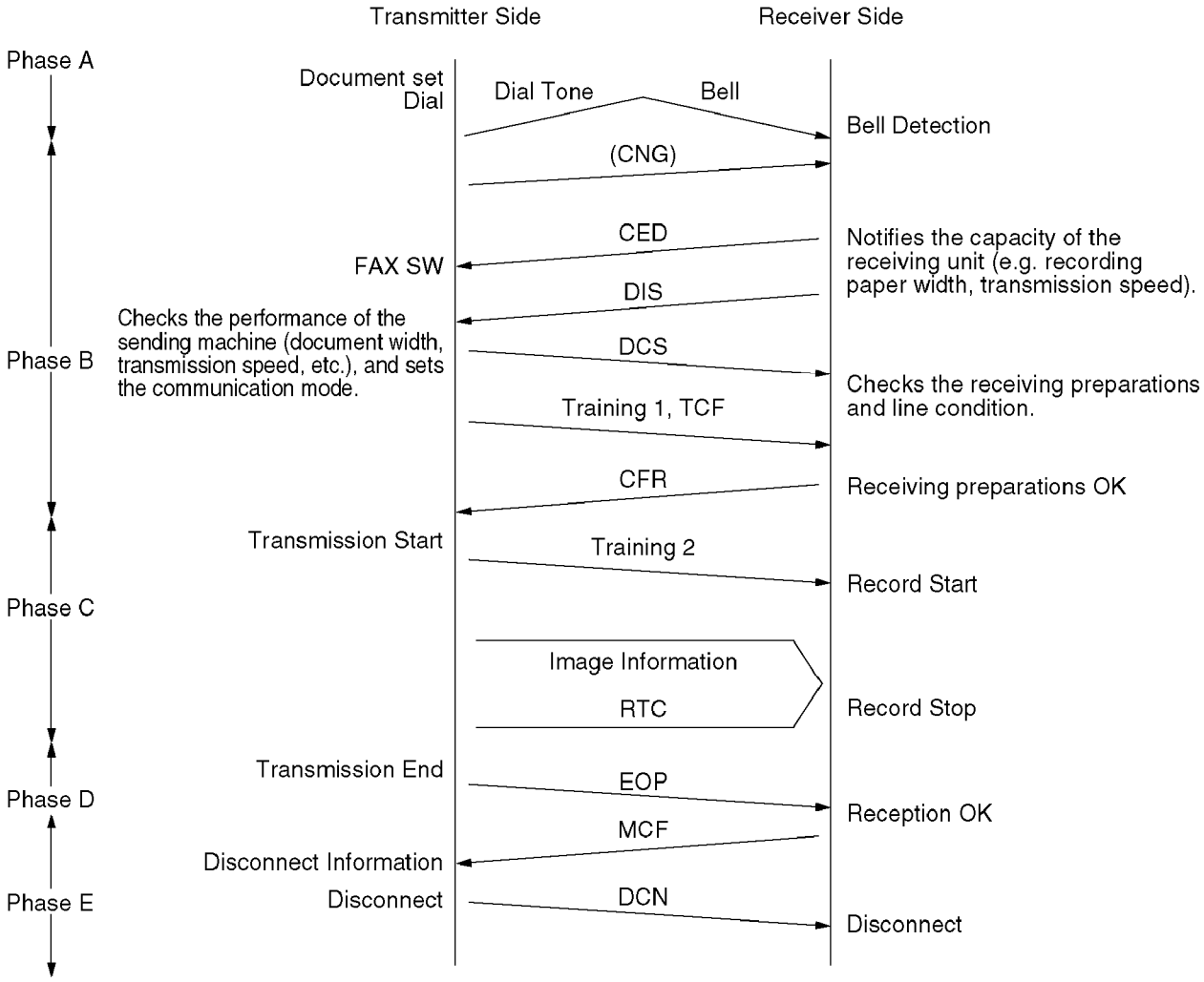
5. Facsimile Standards

Item	Telephone Network Facsimile G3 Machine
Connection Control Mode	Telephone Network Signal Mode
Terminal Control Mode	T. 30 Binary
Facsimile Signal Format	Digital
Modulation Mode	PSK (V. 27 ter) or QAM (V. 29)
Transmission Speed	300 bps (Control Signal) 2400, 4800, 7200, 9600 12000, 14400 bps (FAX Signal)
Redundancy Compression Process (Coding Mode)	1 dimension: MH Mode 2 dimension: MR Mode (K=2.4)
Resolution	Main Scan: 8 pel/mm Sub Scan: 3.85, 7.7l/mm
Line Synchronization Signal	EOL Signal
1 Line Transmission Time [ms/line]	Depends on the degree of data reduction. Minimum Value: 10, 20 Can be recognized in 40ms.

6. Explanation of Communication and Compression Technology

a. G3 Communication Signals (T. 30 Binary Process)

For G3 Facsimile communication, this is the procedure for exchanging control signals between the sending and receiving machines both before and after transmission of image signals.
Control signals at 300 bps FSK are: 1850 Hz...0, 1650Hz...1.
An example of a binary process in G3 communication is shown below.



Explanation of Signals

Control signals are comprised mainly of 8-bit identification signals and the data signals added to them. Data signals are added to DIS and DCS signals.

Signal.....DIS (Digital Identification Signal)

Identification Signal Format.....00000001

Function:

Notifies the capacity of the receiving unit. The added data signals are as follows.

Signal.....DCS (Digital Command Signal)

Identification Signal Format.....X1000001

Example (Some models do not support the following items.):

Bit No.	DIS/DTC	DCS
1	Transmitter --- T.2 operation	
2	Receiver --- T.2 operation	Receiver --- T.2 operation
3	T.2 IOC = 176	T.2 IOC = 176
4	Transmitter --- T.3 operation	
5	Receiver --- T.3 operation	Receiver --- T.3 operation
6	Reserved for future T.3 operation features	
7	Reserved for future T.3 operation features.	
8	Reserved for future T.3 operation features.	
9	Transmitter --- T.4 operation	
10	Receiver --- T.4 operation	Receiver --- T.4 operation
11, 12, 13, 14	Data signaling rate	Data signaling rate
0, 0, 0, 0	V.27 ter fall back mode	2400 bit/s, V.27 ter
0, 1, 0, 0	V.27 ter	4800 bit/s, V.27 ter
1, 0, 0, 0	V.29	9600 bit/s, V.29
1, 1, 0, 0	V.27 ter and V.29	7200 bit/s, V.29
0, 0, 1, 0	Not used	14400 bit/s, V.33
0, 1, 1, 0	Reserved	12000 bit/s, V.33
1, 0, 1, 0	Not used	Reserved
1, 1, 1, 0	V.27 ter and V.29 and V.33	Reserved
0, 0, 0, 1	Not used	14400 bit/s, V.17
0, 1, 0, 1	Reserved	12000 bit/s, V.17
1, 0, 0, 1	Not used	9600 bit/s, V.17
1, 1, 0, 1	V.27 ter and V.29 and V.33 and V.17	7200 bit/s, V.17
0, 0, 1, 1	Not used	Reserved
0, 1, 1, 1	Reserved	Reserved
1, 0, 1, 1	Not used	Reserved
1, 1, 1, 1	Reserved	Reserved
15	R8×7.7 lines/mm and/or 200×200 pels/ 25.4mm	R8×7.7 lines/mm and/or 200×200 pels/ 25.4mm
16	Two-dimensional coding capability	Two-dimensional coding capability

Bit No.	DIS/DTC	DCS
17, 18	Recording width capabilities	Recording width
(0, 0)	1728 picture elements along scan line length of 215 mm ± 1%	1728 picture elements along scan line length of 215 mm ± 1%
(0, 1)	1728 picture elements along scan line length of 215 mm ± 1% 2048 picture elements along scan line length of 255 mm ± 1%	2432 picture elements along scan line length of 303 mm ± 1%
(1, 0)	2432 picture elements along scan line length of 303 mm ± 1%	2048 picture elements along scan line length of 255 mm ± 1%
(1, 1)	1728 picture elements along scan line length of 215 mm ± 1% 2048 picture elements along scan line length of 255 mm ± 1% Invalid	Invalid
19, 20	Maximum recording length capability	Maximum recording length
(0, 0)	A4 (297 mm)	A4 (297 mm)
(0, 1)	Unlimited	Unlimited
(1, 0)	A4 (297 mm) and B4 (364 mm)	B4 (364 mm)
(1, 1)	Invalid	Invalid
21, 22, 23	Minimum scan line time capability of the receiver	Minimum scan line time
(0, 0, 0)	20 ms at 3.85 l/mm: $T_{7.7} = T_{3.85}$	20 ms
(0, 0, 1)	40 ms at 3.85 l/mm: $T_{7.7} = T_{3.85}$	40 ms
(0, 1, 0)	10 ms at 3.85 l/mm: $T_{7.7} = T_{3.85}$	10 ms
(1, 0, 0)	5 ms at 3.85 l/mm: $T_{7.7} = T_{3.85}$	5 ms
(0, 1, 1)	10 ms at 3.85 l/mm: $T_{7.7} = 1/2\ T_{3.85}$	
(1, 1, 0)	20 ms at 3.85 l/mm: $T_{7.7} = 1/2\ T_{3.85}$	
(1, 0, 1)	40 ms at 3.85 l/mm: $T_{7.7} = 1/2\ T_{3.85}$	
(1, 1, 1)	0 ms at 3.85 l/mm: $T_{7.7} = T_{3.85}$	0 ms
24	Extend field	Extend field
25	2400 bit/s handshaking	2400 bit/s handshaking
26	Uncompressed mode	Uncompressed mode
27	Error correction mode	Error correction mode
28	Set to "0".	Frame size 0 = 256 octets 1 = 64 octets
29	Error limiting mode	Error limiting mode
30	Reserved for G4 capability on PSTN	Reserved for G4 capability on PSTN

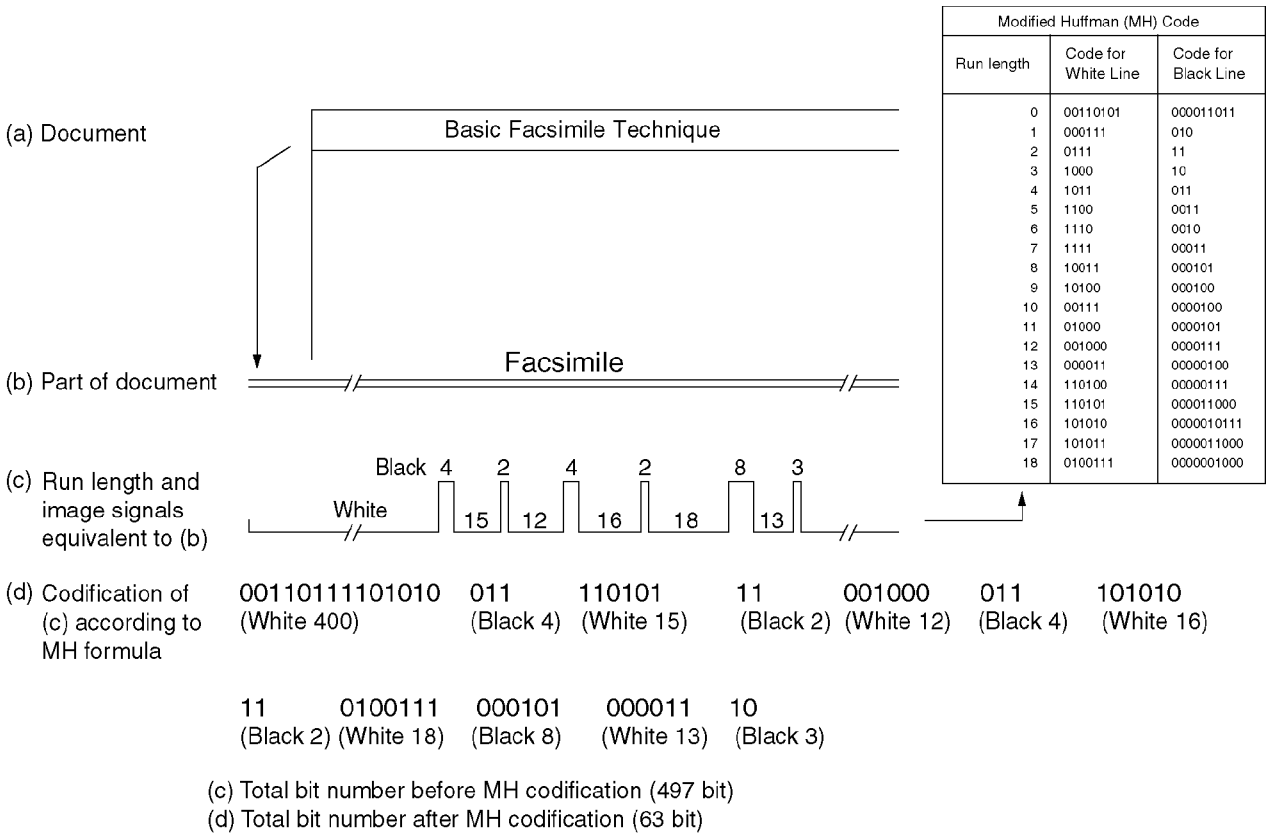
Bit No.	DIS/DTC	DCS
31	T.6 coding capability	T.6 coding enabled
32	Extend field	Extend field
33 (0) (1)	Validity of bits 17, 18 Bits 17, 18 are valid Bits 17, 18 are invalid	Recording width Recording width indicated by bits 17, 18 Recording width indicated by this field bit information
34	Recording width capability 1216 picture elements along scan line length of 151 ± mm 1%	Middle 1216 elements of 1728 picture elements
35	Recording width capability 864 picture elements along scan line length of 107 ± mm 1%	Middle 864 elements of 1728 picture elements
36	Recording width capability 1728 picture elements along scan line length of 151 ± mm 1%	Invalid
37	Recording width capability 1728 picture elements along scan line length of 107 ± mm 1%	Invalid
38	Reserved for future recording width capability.	
39	Reserved for future recording width capability.	
40	Extend field	Extend field
41	R8×15.4 lines/mm	R8×15.4 lines/mm
42	300×300 pels/25.4 mm	300×300 pels/25.4 mm
43	R16×15.4 lines/mm and/or 400×400 pels/25.4 mm	R16×15.4 lines/mm and/or 400×400 pels/ 25.4 mm
44	Inch based resolution preferred	Resolution type selection "0": neritic based resolution "1": inch based resolution
45	Metric based resolution preferred	Don’t care
46	Minimum scan line time capability for higher resolutions "0": $T_{15.4} = T_{7.7}$ "1": $T_{15.4} = 1/2T_{7.7}$	Don’t care
47	Selective Polling capability	Set to "0".
48	Extend field	Extend field

Note 1 - Standard facsimile units conforming to T.2 must have the following capability: Index of cooperation (IOC)=264.
Note 2 - Standard facsimile units conforming to T.3 must have the following capability: Index of cooperation (IOC)=264.
Note 3 - Standard facsimile units conforming to T.4 must have the following capability: Paper length=297 mm.

Signal	Identification Signal Format	Function
Training 1	————————	A fixed pattern is transmitted to the receiving side at a speed (2400 to 14400 bps) designated by DCS, and the receiving side optimizes the automatic equalizer, etc., according to this signal.
TCF (Training Check)	————————	Sends 0 continuously for 1.5 seconds at the same speed as the training signal.
CFR (Confirmation to Receive)	X0100001	Notifies the sending side that TCF has been properly received. If TCF is not properly received, FTT (Failure To Train) X0100010 is relayed to the sender. The sender then reduces the transmission speed by one stage and initiates training once again.
Training 2	————————	Used for reconfirming the receiving side like training 1.
Image Signal	Refer to the next page.	————————
RTC (Return to Control)	————————	Sends 12 bits (0...01 × 6 times) to the receiver at the same speed as the image signal and notifies completion of transmission of the first sheet.
EOP (End of Procedure)	X1110100	End of one communication
MCF (Message Confirmation)	X0110001	End of 1 page reception
DCN (Disconnect)	X1011111	Phase E starts.
MPS (Multi-Page Signal)	X1110010	Completion of transmission of 1 page. If there are still more documents to be sent, they are output instead of EOP. After MCF reception, the sender transmits an image signal of the second sheet.
PRI-EOP (Procedural Interrupt-EOP)	X1111100	If there is an operator call from the sender, it is output after RTC.
PIP (Procedural Interrupt Positive)	X0110101	This is output when an operator call is received.

b. Redundancy Compression Process Coding Mode

This unit uses one-dimensional MH format.



Modified Huffman (MH) Code		
Run length	Code for White Line	Code for Black Line
0	00110101	000011011
1	000111	010
2	0111	11
3	1000	10
4	1011	011
5	1100	0011
6	1110	0010
7	1111	00011
8	10011	000101
9	10100	000100
10	00111	0000100
11	01000	0000101
12	001000	0000111
13	000011	00000100
14	110100	00000111
15	110101	000011000
16	101010	0000010111
17	101011	0000011000
18	0100111	0000001000

(c) Total bit number before MH codification (497 bit)
(d) Total bit number after MH codification (63 bit)

8.5. TEST CHART

8.5.1. ITU-T No.1 TEST CHART

THE SLEREXE COMPANY LIMITED

SAPORS LANE - BOOLE - DORSET - BH 25 8 ER

TELEPHONE BOOLE (945 13) 51617 - TELEX 123456

Our Ref. 350/PJC/EAC

18th January, 1972.

Dr. P.N. Cundall,
Mining Surveys Ltd.,
Holroyd Road,
Reading,
Berks.

Dear Pete,

Permit me to introduce you to the facility of facsimile transmission.

In facsimile a photocell is caused to perform a raster scan over the subject copy. The variations of print density on the document cause the photocell to generate an analogous electrical video signal. This signal is used to modulate a carrier, which is transmitted to a remote destination over a radio or cable communications link.

At the remote terminal, demodulation reconstructs the video signal, which is used to modulate the density of print produced by a printing device. This device is scanning in a raster scan synchronised with that at the transmitting terminal. As a result, a facsimile copy of the subject document is produced.

Probably you have uses for this facility in your organisation.

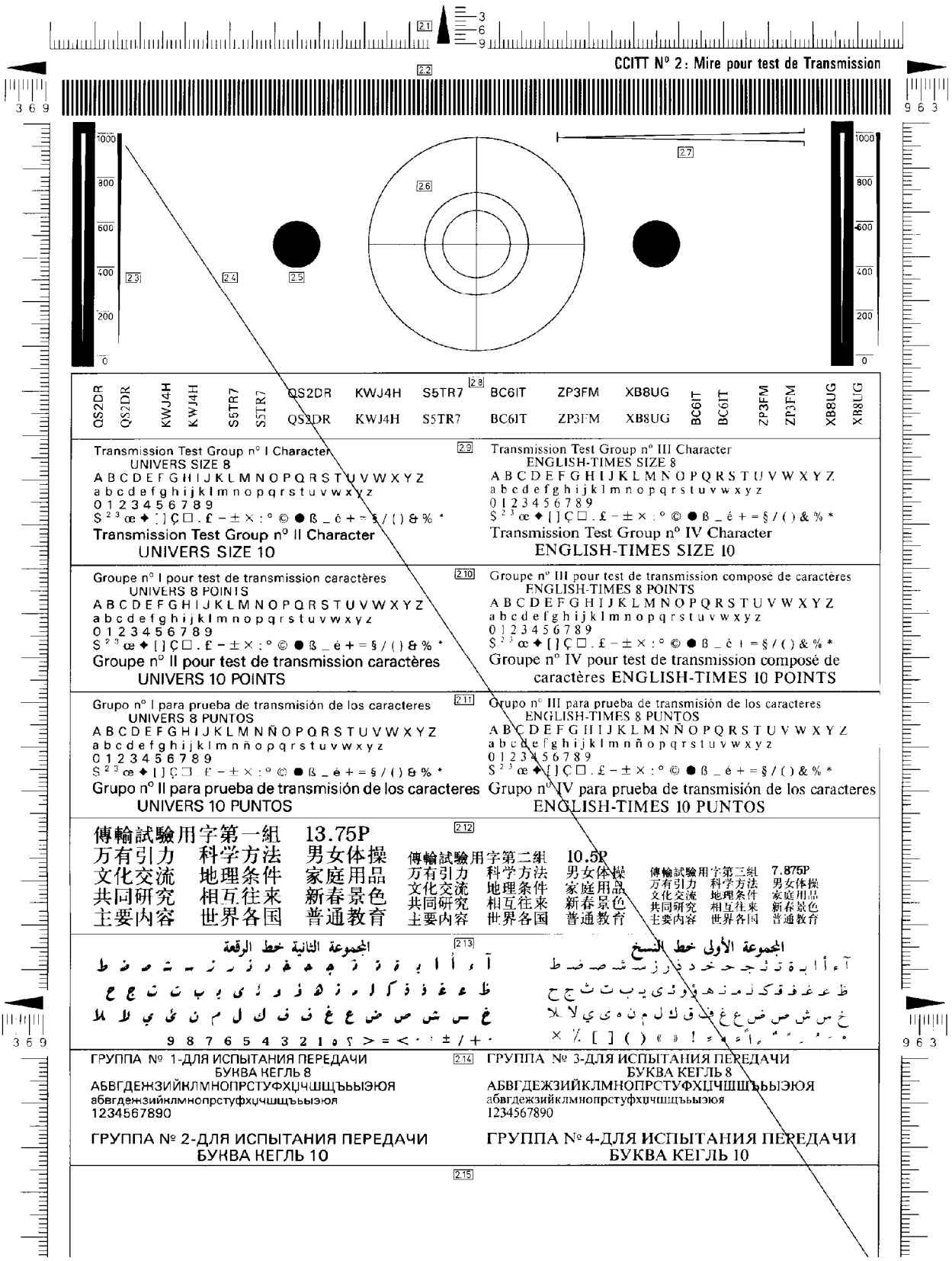
Yours sincerely,

Phil.

P.J. CROSS
Group Leader - Facsimile Research

Registered in England: No. 2038
Registered Office: 60 Vicara Lane, Ilford. Essex.

8.5.2. ITU-T No.2 TEST CHART


CCITT N° 2 : Mire pour test de Transmission
2.1
2.2
2.3
2.4
2.5
2.6
2.7
2.8
2.9
2.10
2.11
2.12
2.13
2.14
2.15
QS2DR KWJ4H S5TR7 BC6IT ZP3FM XB8UG
Transmission Test Group n° I Character
UNIVERS SIZE 8
Transmission Test Group n° II Character
UNIVERS SIZE 10
Transmission Test Group n° III Character
ENGLISH-TIMES SIZE 8
Transmission Test Group n° IV Character
ENGLISH-TIMES SIZE 10
Groupe n° I pour test de transmission caractères
UNIVERS 8 POINTS
Groupe n° II pour test de transmission caractères
UNIVERS 10 POINTS
Groupe n° III pour test de transmission composé de caractères
ENGLISH-TIMES 8 POINTS
Groupe n° IV pour test de transmission composé de
caractères ENGLISH-TIMES 10 POINTS
Grupo n° I para prueba de transmisión de los caracteres
UNIVERS 8 PUNTOS
Grupo n° II para prueba de transmisión de los caracteres
UNIVERS 10 PUNTOS
Grupo n° III para prueba de transmisión de los caracteres
ENGLISH-TIMES 8 PUNTOS
Grupo n° IV para prueba de transmisión de los caracteres
ENGLISH-TIMES 10 PUNTOS
傳輸試驗用字第一組 13.75P
万有引力 科学方法 男女体操
文化交流 地理条件 家庭用品
共同研究 相互往来 新春景色
主要内容 世界各国 普通教育
傳輸試驗用字第二組 10.5P
万有引力 科学方法 男女体操
文化交流 地理条件 家庭用品
共同研究 相互往来 新春景色
主要内容 世界各国 普通教育
傳輸試驗用字第三組 7.875P
万有引力 科学方法 男女体操
文化交流 地理条件 家庭用品
共同研究 相互往来 新春景色
主要内容 世界各国 普通教育
المجموعة الأولى خط النسخ
المجموعة الثانية خط الرقعة
ГРУППА № 1-ДЛЯ ИСПЫТАНИЯ ПЕРЕДАЧИ
БУКВА КЕГЛЬ 8
ГРУППА № 2-ДЛЯ ИСПЫТАНИЯ ПЕРЕДАЧИ
БУКВА КЕГЛЬ 10
ГРУППА № 3-ДЛЯ ИСПЫТАНИЯ ПЕРЕДАЧИ
БУКВА КЕГЛЬ 8
ГРУППА № 4-ДЛЯ ИСПЫТАНИЯ ПЕРЕДАЧИ
БУКВА КЕГЛЬ 10

9. FIXTURES AND TOOLS

10. CABINET, MECHANICAL AND ELECTRICAL PARTS LOCATION

10.1. OPERATION PANEL SECTION

10.2. UPPER CABINET SECTION

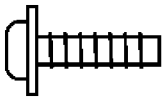
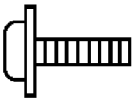
10.3. ADF SECTION

CROSS REFERENCE:
OPERATION PANEL SECTION(
)

10.4. LOWER CABINET SECTION

10.5. MOTOR SECTION

10.6. ACTUAL SIZE OF SCREWS

	Parts No.	Illustration
Ⓐ	XTW3+S10P	 (Φ3 mm x 10 mm)
Ⓑ	XSB4+6	(Φ4 mm x 6 mm)
Ⓒ	PFHD1018Z	 (Φ3 mm x 8 mm)

11. ACCESSORIES AND PACKING MATERIALS

12. REPLACEMENT PARTS LIST

Notes:

1. The marking (RTL) indicates that the Retention Time is limited for this item.
After the discontinuation of this assembly in production, the item will continue to be available for a specific period of time. The retention period of availability is dependent on the type of assembly, and in accordance with the laws governing parts and product retention.
After the end of this period, the assembly will no longer be available.

2. Important safety notice
Components identified by ⚠ mark have special characteristics important for

safety. When replacing any of these components, use only manufacture's specified parts.

3. The S mark means the part is one of some identical parts. For that reason, it may be different from the installed part.

4. RESISTORS & CAPACITORS

Unless otherwise specified;

All resistors are in ohms (Ω) K=1000 Ω , M=1000k Ω

All capacitors are in MICRO FARADS (μ F) P= μ μ F

***Type & Wattage of Resistor**

Type

ERC:Solid ERD:Carbon PQ4R:Chip	ERX:Metal Film ERG:Metal Oxide ERO:Metal Film	PQRD:Carbon PQRQ:Fuse ERF:Wire Wound

Wattege

10,16,18:1/8W	14,25,S2:1/4W	12,50,S1:1/2W	1:1W	2:2W	5:5W

ECFD:Semi-Conductor ECQS:Styrol PQCBX,ECUV:Chip ECMS:Mica	ECCD,ECKD,PQCBC,PQVP : Ceramic ECQM,ECQV,ECQE,ECQU,ECQB : Polyester ECEA,ECSZ,ECOS : Electrolytic ECQP : Polypropylene

Voltage

ECQ Type	ECQG ECQV Type	ECSZ Type	Others	
1H : 50V 2A : 100V 2E : 250V 2H : 500V	05 : 50V 1 : 100V 2 : 200V	OF : 3.15V 1A : 10V 1V : 35V OJ : 6.3V	OJ : 6.3V 1A : 10V 1C : 16V 1E,25 : 25V	1V : 35V 50,1H : 50V 1J : 63V 2A : 100V

12.1. CABINET AND ELECTRICAL PARTS

12.1.1. OPERATION PANEL SECTION

Ref. No.	Part No.	Part Name & Description	Remarks
1	PFDR1054Z	ROLLER,DOCUMENT FEED	
2	PFUS1515Z	SPRING	
3	PFDG1354Z	GEAR	POM-HB
4	PFHX1735Z	SPACER	
5	PFHG1185Z	SEPARATION RUBBER	
6	PFUS1503Z	LEAF SPRING	
7	PFUV1069Z	COVER	
8	PFJS10Q92Z	CONNECTOR,OPERATION	
9	PFBX1209Z1	BUTTON,START/STOP	ABS-HB
10	PFBX1207V1	BUTTON,NAVI	ABS-HB
11	PFBC1107Z1	BUTTON,SP-PHONE	ABS-HB
12	PFBX1208Z1	BUTTON,DIAL	ABS-HB
13	PFGG1201V1	GRILLE,OPERATION PANEL	PS-HB
14	PFGP1254Z	PANEL,LCD	
15	PFGG1202V1	GRILLE,OPA PANEL(SUB)	PS-HB
16	PFHX1660Z	SPACER	
17	PQJM128Z	BUILTIN-MICROPHONE	
18	WLK26YR03AA	LEAD WIRE,RED	
19	WLK26YW03AA	LEAD WIRE,WHITE	

12.1.2. UPPER CABINET SECTION

Ref. No.	Part No.	Part Name & Description	Remarks
30	PFHX1650Z	PLASTIC PARTS	
31	PFJS12P58Z	CONNECTOR,THERMAL HEAD	
32	PFUS1205Z	SPRING	
33	PFHR1395Z	ANGLE	POM-HB
34	PFHR1396Z	ANGLE	POM-HB
35	L1CC00000056	THERMAL HEAD	
36	PFDF1103Z	SHAFT,LOCK LEVER	
37	PFHR1394Z2	LEVER,LOCK	ABS+G (30)-HB
38	PFUS1487Z	SPRING,LEVER LOCK	
39	PFUS1486Z	SPRING	
40	PFUS1519Z	SPRING,OPE LOCK	
41	PFUS1498Z	SPRING,POP UP	
42	PFQT2159Z	LABEL,BLUE GEAR	
43	PFQT2107Z	LABEL,INK FILM	
44	PFUS1490Z	SPRING	
45	PFKM1120Y2	CABINET BODY	PS-VO
46	PFUS1494Z	SPRING,CIS	
47	N2GZBE000007	IMAGE SENSOR	
48	PFJS07P59Z	CONNECTOR,CIS	
49	PFUS1495Z	SPRING	
50	PFDF1017Z	SHAFT	
51	PFDR1045Z	ROLLER,SEPARATION(SUB)	
52	PFGT2295Z-C	NAME PLATE	
53	PFQT1254Y	LABEL,CAUTION	

12.1.3. ADF SECTION

Ref. No.	Part No.	Part Name & Description	Remarks
70	PFQT2165Z	LABEL	
71	PFDE1220Z2	LEVER	PS-HB
72	PFDE1221Z2	GUIDE	PS-HB
73	PFHG1161Z	RUBBER PARTS	
74	PFUS1514Z	SPRING	
75	PFKE1032Y2	CASE,PICK UP	PS-HB
76	PFHG1186Z	SEPARATION RUBBER	
77	PFHR1393Z	CASE,SEPARATION	ABS-HB
78	PFUS1513Z	SPRING,SEPARATION	
79	PFDR1050Z	ROLLER,PICK UP	
80	PFHR1267Z	COVER	PS-HB
81	PFSH1A010Z	PUSH SWITCH	
82	PFJS02Q95Z	CONNECTOR	
83	PFUA1054Z2	CHASSIS	PS-HB
84	PFDG1230Z	GEAR	POM-HB
85	PFUS1512Z	SPRING	
86	PFDG1360Z	GEAR,PICK UP	POM-HB
87	PFDG1228Z	GEAR,PAPER FEED	POM-HB
88	PFDG1227Z	GEAR	POM-HB
89	PFDJ1048Z	SPACER	POM-HB
90	PFDN1070Z	ROLLER,PAPER FEED	
91	PFDJ1047Z	SPACER	POM-HB
92	PFQT2168Z	LABEL,FACE DOWN	
93	PFQT2171Z	LABEL,OPEN	
94	PFKR1033Z1	GUIDE	POM-HB
95	PFKR1034Z1	GUIDE	POM-HB
96	PFKV1088Y2	COVER	PS-HB
97	PFUS1312Z	SPRING	
98	PFDR1028Z	ROLLER	POM-HB
99	PFDG1015Z	GEAR	POM-HB
100	PFUS1317Z	SPRING	
101	PFUS1505Z	SPRING	
102	PFKV1089Z1	CASE/COVER	PS-HB
103	PFDR1051Z	ROLLER,PAPER EXIT	
104	PFDG1352Z	GEAR,EXIT ROLLER	POM-HB
105	PFHX1729Y	COVER,SHEET	

12.1.4. BACK COVER SECTION

Ref. No.	Part No.	Part Name & Description	Remarks
120	PFHG1109Z	RUBBER PARTS,LEG	
121	PFMD1070Y	COVER,BOTTOM	
122	PFJS07Q90Z	CONNECTOR,POWER BOARD	
123	PFJS07Q91Z	CONNECTOR,HOOK SWITCH	
124	PFHX1697Z	PLASTIC PARTS,SHEET	
125	PFUS1491Z	SPRING,HEAD ERATH	
126	PFUS1489Z	SPRING,LOCK SHAFT ERATH	
127	PFBH1026Z2	BUTTON,HOOK	ABS-HB
128	PFUS1496Z	SPRING,SPEAKER	
129	PFAS50P006Z	SPEAKER	
130	PFJS02Q93Z	LEAD WIRE,SPEAKER	
131	PFDR1014Z	ROLLER,SEPARATION	
132	PFDG1353Z	GEAR,SEPARATION	POM-HB
133	PQLB1E1	INSULATOR	
134	PFJP03S04Z	AC SOCKET	⚠S
135	PQMX10010Z	COVER	
136	KR06TT251508	INSULATOR	
137	PFJS02R19Y	CONNECTER,AC INLET	
138	WLR18YK26CM4	LEAD WIRE,AC INLET	
139	PQHR945Z	BAND,AC INLET	
140	PQLB1E1	INSULATOR,AC INLET	
141	XWC4B	WASHER	

12.1.5. MOTOR SECTION

Ref. No.	Part No.	Part Name & Description	Remarks
160	PFJQ1016Z	MOTOR	
161	PFMD1069Z	COVER	PS-HB
162	PFHR1431Z	COVER	
163	PFDG1132Z	GEAR	POM-HB
164	PFDG1253Z	GEAR	POM-HB
165	PFDG1134Y	GEAR	POM-HB
166	PFUS1329Z	SPRING	
167	PFDG1356Z	GEAR	POM-HB
168	PFDE1222Z	SPACER	POM-HB
169	PFDG1357Z	GEAR	POM-HB
170	PFHR1401Z	ARM	POM-HB
171	PFHR1257Z	ARM	POM-HB
172	PFHR1398Y	ARM	POM-HB
173	PFHR1400Z	ARM	POM-HB
174	PFHR1399Z	ARM	POM-HB
175	PFDG1129Z	GEAR	POM-HB
176	PFDG1234Z	GEAR	POM-HB
177	PFDG1233Z	GEAR	POM-HB
178	PFDG1359Z	GEAR	POM-HB
179	PFUS1314Z	SPRING	
180	PFUA1055Y	CHASSIS	ABS+PBT-HB
181	PFDX1040Z	GEAR	

12.1.6. ACCESSORIES AND PACKING MATERIALS

Ref. No.	Part No.	Part Name & Description	Remarks
A1	PFQW2015Z	LEAFLET	
A2	PFQX1967Z	INSTRUCTION BOOK	
A3	PFZXFP141E	TRAY,PAPER	
A4	PFJA04B011Z	CORD,TEL (GERMANY)	S
A4	PFJA04B010Z	CORD,TEL (AUSTRIA)	S
A5	PQJA10038Y	POWER CORD	⚠
A6	PFJA04C001Z	CORD,HANDSET	
A7	PFJXH0530Z	HANDSET	
A8	PFPE1251Z	INK FILM	
P1	PFZE1156Z	PACKING CASE	
P2	PFPN1328Z	CUSHION	
P3	PFPN1329Z	CUSHION	
P4	PFPH1030Z	PACKING SHEET	
P5	XZB20X35A04	PROTECTION COVER	
P6	XZB26X35A04	PROTECTION COVER	

12.2. DIGITAL BOARD PARTS

Ref. No.	Part No.	Part Name & Description	Remarks
PCB1	PFWP1FP145G	DEGITAL BOARD ASS'Y (RTL)	
PCB1-1	K0L1BA000100	SWITCH (SW501)	
		(Ics)	
IC501	C1ZBZ0001896	IC	
IC502	PFWIFP145G	IC (ROM)	
IC503	C3ABKC000027	IC	
IC505	PFVIR675813	IC	
IC507	PFVII5510011	IC	
IC508	PFVIT2003APS	IC	S
IC509	PQVITC4066BF	IC	S
IC510	PQVIMC34119M	IC	S
IC511	PQVINJM2904F	IC	S
IC512	C3FAKC000008	IC	
IC516	PFVITVT245FT	IC	S
IC517	PQVITC7S08FU	IC	S
IC519	PQVIMC7H374F	IC	
		(TRANSISTORS)	
IC506	PFVTSI4431DY	TRANSISTOR(SI)	S
Q501	PQVTDTC143E	TRANSISTOR(SI)	S
Q502	2SB1322	TRANSISTOR(SI)	S
Q503	PQVTDTC143E	TRANSISTOR(SI)	S
Q505	2SD1819A	TRANSISTOR(SI)	S
Q506	2SD1819A	TRANSISTOR(SI)	S
Q507	2SD1819A	TRANSISTOR(SI)	S
Q520	2SB1197KQ	TRANSISTOR(SI)	S
Q524	2SD1819A	TRANSISTOR(SI)	S
		(DIODES)	
D501	PFVDRMRLS245	DIODE(SI)	S
D502	MA7160	DIODE(SI)	S
D503	PFVDRMRLS245	DIODE(SI)	S
		(BATTERY)	
BAT501	PFSU1004Z	LITHIUM BATTERY	⚠S
		(COILS)	
L506	J0JCC0000042	COIL	
L512	PQLQR2KA20T	COIL	S
L514	J0JCC0000042	COIL	
L515	PQLQR2KA20T	COIL	S
L519	PQLQR2KA113	COIL	S
L535	PQLQR2KA20T	COIL	S
		(COMPONENTS PARTS)	
RA501	EXB38V101JV	RESISTOR ARRAY	
RA502	EXB38V101JV	RESISTOR ARRAY	
RA503	EXB38V101JV	RESISTOR ARRAY	
RA504	EXB38V101JV	RESISTOR ARRAY	
RA505	EXB38V101JV	RESISTOR ARRAY	
RA506	EXB38V101JV	RESISTOR ARRAY	
RA509	EXB38V101JV	RESISTOR ARRAY	
RA510	EXB38V101JV	RESISTOR ARRAY	
RA511	EXB38V101JV	RESISTOR ARRAY	
RA513	EXB38V103JV	RESISTOR ARRAY	

Ref. No.	Part No.	Part Name & Description	Remarks
		(CONNECTORS)	
CN502	PQJP5G30Z	CONNECTOR,5P	S
CN503	PQJP7G30Z	CONNECTOR,7P	S
CN504	PQJP10G30Z	CONNECTOR,10P	S
CN505	PQJP12G30Z	CONNECTOR,12P	S
CN506	PQJP7G30Z	CONNECTOR,7P	S
CN507	PQJP2G30Z	CONNECTOR,2P	S
CN508	K1MN08A00017	CONNECTOR,8P	
CN510	PQJP2G30Z	CONNECTOR,2P	S
CN520	PQJP2G30Z	CONNECTOR,2P	S
CN521	PQJP12A19Z	CONNECTOR,12P	
CN522	PQJP08A19Z	CONNECTOR,8P	S
		(CRYSTAL OSCILLATORS)	
X501	H0A327200090	CRYSTAL OSCILLATOR	
X502	H2D240500001	CRYSTAL OSCILLATOR	
X503	PFVC32256ZAT	CRYSTAL OSCILLATOR	S
		(FUSES)	
F502	PFRB0031125T	FUSE	S
F503	PFRB001251KC	FUSE	S
		(RESISTORS)	
L510	ERJ3GEY0R00	0	
L516	ERJ3GEYJ101	100	
L517	ERJ3GEYJ101	100	
L518	PQ4R18XJ220	22	S
L520	ERJ3GEY0R00	0	
L530	ERJ3GEY0R00	0	
L531	ERJ3GEY0R00	0	
L532	ERJ3GEY0R00	0	
L533	ERJ3GEY0R00	0	
L534	ERJ3GEY0R00	0	
R501	ERJ3GEYJ562	5.6k	
R502	ERJ3GEYJ472	4.7k	
R503	ERJ3GEYJ101	100	
R504	ERJ3GEYJ101	100	
R505	ERJ3GEYJ101	100	
R506	ERJ3GEYJ101	100	
R507	ERJ3GEYJ101	100	
R508	ERJ3GEYJ101	100	
R509	ERJ3GEY0R00	0	
R510	ERJ3GEYJ101	100	
R514	ERJ3GEYJ821	820	
R516	ERDS1VJ152	1.5k	S
R517	ERJ3GEYJ222	2.2k	
R522	ERJ3GEYJ223	22k	
R523	ERJ3GEYJ433	43k	
R524	ERJ3GEYJ101	100	
R525	ERJ3GEYJ472	4.7k	
R526	ERJ3EKF1101	1.1k	
R527	ERJ3GEY0R00	0	
R528	ERJ3GEYJ472	4.7k	

Ref. No.	Part No.	Part Name & Description	Remarks
R529	ERJ3EKF3602	360k	
R530	ERJ3GEYJ101	100	
R531	ERJ3GEYJ334	330k	
R532	ERJ3GEYJ475	4.7M	
R533	ERJ3GEYJ203	20k	
R544	ERJ3GEYJ222	2.2k	
R545	ERJ3GEYJ471	470	
R546	ERJ3GEYJ102	1k	
R548	ERJ3GEYJ103	10k	
R549	ERJ3GEYJ101	100	
R550	ERJ3GEYJ103	10k	
R551	ERJ3GEYJ101	100	
R552	ERJ3GEYJ470	47	
R553	ERJ3GEYJ105	1M	
R556	ERJ3GEY0R00	0	
R557	ERJ3GEYJ101	100	
R558	ERJ3GEYJ272	2.7k	
R561	ERJ3GEYJ472	4.7k	
R563	ERJ3GEYJ221	220	
R565	ERJ3GEYJ222	2.2k	
R566	ERJ3GEYJ102	1k	
R567	ERJ3GEYJ102	1k	
R569	ERJ3GEYJ683	68k	
R576	ERJ3GEYJ103	10k	
R577	ERJ3GEYJ102	1k	
R578	ERJ3GEYJ222	2.2k	
R582	ERJ3GEYJ561	560	
R585	ERJ3GEYJ103	10k	
R586	PQ4R10XJ000	0	S
R588	ERJ3GEYJ103	10k	
R590	ERJ3GEYJ472	4.7k	
R591	ERJ3GEYJ101	100	
R599	ERJ3GEYJ103	10k	
R600	ERG2SJ152	1.5k	
R601	ERJ3GEYJ103	10k	
R603	ERG2SJ391	390	
R619	ERJ3GEYJ333	33k	
R621	ERJ3GEYJ4R7	4.7	
R625	ERJ3GEYJ101	100	
R626	ERJ3GEYJ101	100	
R629	ERJ3GEYJ101	100	
R630	ERJ3GEYJ101	100	
R634	ERJ3GEYJ101	100	
R635	ERJ3GEYJ103	10k	
R641	ERJ3GEYJ472	4.7k	
R682	ERJ3GEYJ104	100k	
R683	ERJ3GEYJ103	10k	
R690	ERJ3GEYJ473	47k	
R691	ERJ3GEYJ103	10k	
R692	ERJ3GEYJ224	220k	

Ref. No.	Part No.	Part Name & Description	Remarks
R693	ERJ3GEYJ243	24k	
R694	ERJ3GEYJ203	20k	
R695	ERJ3GEYJ333	33k	
R697	ERJ3GEYJ223	22k	
R698	ERJ3GEYJ114	110k	
R699	ERJ3GEYJ222	2.2k	
R700	ERJ3GEYJ222	2.2k	
R701	ERJ3GEY0R00	0	
R702	ERJ3GEYJ102	1k	
R704	ERJ3GEYJ123	12k	
R705	ERJ3GEYJ822	8.2k	
R706	ERJ3GEY0R00	0	
R707	ERJ3GEY0R00	0	
R710	ERJ3GEY0R00	0	
R713	ERJ3GEYJ102	1k	
R720	ERJ3GEYJ103	10k	
R732	ERJ3GEYJ103	10k	
R733	ERJ3GEYJ102	1k	
R735	ERJ3GEYJ124	120k	
R736	ERJ3GEYJ124	120k	
		(CAPACITORS)	
C501	ECEA1HKS100	10	S
C502	ECUV1C104ZFV	0.1	
C503	ECEA1CK101	100	S
C504	PQCUV1H104ZF	0.1	
C506	ECUV1H101JCV	100p	
C508	ECUV1H102KBV	0.001	
C509	ECUV1H102KBV	0.001	
C510	ECUV1C104ZFV	0.1	
C511	ECUV1H103KBV	0.01	
C513	ECUV1C104ZFV	0.1	
C514	ECUV1C104ZFV	0.1	
C515	ECUV1C104ZFV	0.1	
C516	ECUV1C104ZFV	0.1	
C517	ECUV1C104ZFV	0.1	
C518	ECUV1H222KBV	0.0022	
C519	ECUV1C104KBV	0.1	
C520	ECUV1H102KBV	0.001	
C522	ECUV1C104KBV	0.1	
C523	ECUV1H150JCV	15p	
C524	ECUV1C104ZFV	0.1	
C525	ECUV1H120JCV	12p	
C526	ECEA1CKA100	10	S
C527	ECUV1C104ZFV	0.1	
C528	ECEA1CKA100	10	S
C529	ECUV1C104ZFV	0.1	
C530	ECUV1C104ZFV	0.1	
C531	ECUV1C104ZFV	0.1	
C532	ECUV1C104ZFV	0.1	
C533	ECUV1C104ZFV	0.1	

Ref. No.	Part No.	Part Name & Description	Remarks
C534	ECEA1CK101	100	S
C535	ECUV1C104ZFV	0.1	
C536	ECUV1C104ZFV	0.1	
C537	ECUV1C104ZFV	0.1	
C538	ECUV1C104ZFV	0.1	
C539	ECUV1H101JCV	100p	
C542	ECUV1C104ZFV	0.1	
C543	ECUV1C104ZFV	0.1	
C546	ECUV1C104ZFV	0.1	
C547	ECUV1C104ZFV	0.1	
C549	ECUV1C104KBV	0.1	
C550	ECUV1H330JCV	33p	
C552	ECUV1C104KBV	0.1	
C554	ECUV1H472KBV	0.0047	S
C556	ECUV1H103KBV	0.01	
C559	ECUV1C104ZFV	0.1	
C560	ECUV1C104ZFV	0.1	
C561	ECUV1C104KBV	0.1	
C564	ECEA1CKA100	10	S
C565	ECEA1CKA100	10	S
C566	ECUV1C104ZFV	0.1	
C569	ECUV1C104ZFV	0.1	
C573	ECUV1C104KBV	0.1	
C575	ECUV1C104ZFV	0.1	
C577	ECUV1H333KBV	0.033	S
C578	ECUV1C104ZFV	0.1	
C583	ECUV1C104ZFV	0.1	
C588	ECEA1HKA4R7	4.7	S
C589	ECUV1H102KBV	0.001	
C594	ECUV1C104KBV	0.1	
C595	ECUV1H102KBV	0.001	
C598	ECUV1H100DCV	10p	
C599	ECUV1H100DCV	10p	
C603	ECUV1H100DCV	10p	
C605	ECUV1C104ZFV	0.1	
C609	ECUV1C104ZFV	0.1	
C610	ECUV1C104ZFV	0.1	
C611	ECUV1C104ZFV	0.1	
C612	ECUV1C104ZFV	0.1	
C614	ECUV1C104ZFV	0.1	
C618	ECUV1H102KBV	0.001	
C619	ECUV1C104ZFV	0.1	
C620	ECUV1C104ZFV	0.1	
C621	ECUV1C104ZFV	0.1	
C628	ECUV1C104ZFV	0.1	
C631	ECUV1C104ZFV	0.1	
C634	ECUV1C104ZFV	0.1	
C635	ECUV1C104ZFV	0.1	
C640	ECUV1H100DCV	10p	
C665	ECUV1C104ZFV	0.1	

Ref. No.	Part No.	Part Name & Description	Remarks
C669	ECUV1C104ZFV	0.1	
C671	ECUV1H562KBV	0.0056	
C672	ECUV1C104KBV	0.1	
C674	ECUV1C683KBV	0.068	
C676	ECUV1H561JCV	560p	S
C677	ECUV1C104KBV	0.1	
C678	ECUV1C104KBV	0.1	
C679	ECUV1H221JCV	220p	S
C683	ECEA0JKA470	47	S
C684	ECUV1C104ZFV	0.1	
C691	ECUV1C104ZFV	0.1	
C692	ECUV1C104ZFV	0.1	
C693	ECUV1C104ZFV	0.1	
C694	ECUV1C104ZFV	0.1	
C697	ECUV1C104ZFV	0.1	
C698	ECUV1C104ZFV	0.1	
C699	ECUV1C104KBV	0.1	
C700	ECUV1C104ZFV	0.1	

12.3. ANALOG BOARD PARTS

Ref. No.	Part No.	Part Name & Description	Remarks
PCB2	PFLP1519GZ-A	ANALOG BOARD ASS'Y (RTL)	⚠
		(ICs)	
IC101	PFVINJM2904M	IC	S
IC102	PFVIPC4082T2	IC	S
IC103	PFVIPC4082T2	IC	S
IC106	C0AABB000025	IC	
IC108	PFVIPC4082T2	IC	S
		(TRANSISTORS)	
Q101	PQVTDTC143E	TRANSISTOR(SI)	S
Q105	PQVTDTC143E	TRANSISTOR(SI)	S
Q109	2SC2235	TRANSISTOR(SI)	S
Q110	PQVTDTC114EU	TRANSISTOR(SI)	S
Q111	PQVTDTC114EU	TRANSISTOR(SI)	S
Q114	2SD1819A	TRANSISTOR(SI)	S
Q115	2SD1819A	TRANSISTOR(SI)	S
		(DIODES)	
D103	MA4056	DIODE(SI)	S
D104	MA4056	DIODE(SI)	S
D107	1SS119	DIODE(SI)	S
D109	PFVDDGS1ZB60	DIODE(SI)	S
D110	1SS119	DIODE(SI)	S
D111	MA4056	DIODE(SI)	S
D112	MA4056	DIODE(SI)	S
D113	MA4047	DIODE(SI)	S
D114	1SS119	DIODE(SI)	S

Ref. No.	Part No.	Part Name & Description	Remarks
D115	1SS119	DIODE(SI)	S
DA1	MA143	DIODE(SI)	S
		(CAPACITORS)	
C101	ECUV1C333KBV	0.033	
C102	ECUV1C273KBV	0.027	
C103	ECUV1C273KBV	0.027	
C104	ECUV1C333KBV	0.033	
C105	ECUV1C333KBV	0.033	
C106	ECQE2E105KZ	1	S
C109	ECUV1H331JCV	330p	
C110	ECUV1H331JCV	330p	
C111	ECKD2H681KB	680p	S
C112	ECKD2H681KB	680p	S
C115	ECEA1CKS470	47	S
C118	ECEA1HKS2R2	2.2	
C119	ECUV1C473KBV	0.047	
C120	ECUV1C473KBV	0.047	
C121	ECUV1C104ZFV	0.1	
C122	ECEA1HKS100	10	S
C125	PQCUV1C104KB	0.1	
C126	PQCUV1C334KB	0.33	
C127	PQCUV1C334KB	0.33	
C128	PQCUV1C104KB	0.1	
C129	PQCUV1C334KB	0.33	
C131	ECUV1C823KBV	0.082	
C133	ECUV1H681JCV	680p	S
C135	ECUV1C823KBV	0.082	
C137	ECUV1H681JCV	680p	S
C138	ECUV1H100DCV	10p	
C139	PQCUV1E104MD	0.1	S
C140	ECUV1H392KBV	0.0039	
C141	ECUV1H392KBV	0.0039	
C142	PQCUV1E104MD	0.1	S
C143	ECUV1H472KBV	0.0047	S
C144	ECUV1H332KBV	0.0033	
C145	ECUV1H682KBV	0.0068	S
C146	ECUV1H222KBV	0.0022	
C147	PQCUV1E104MD	0.1	S
C148	ECUV1C223KBV	0.022	
C149	ECUV1H821JCV	820p	
C150	ECEA1HKS4R7	4.7	S
C151	ECUV1C333KBV	0.033	
C152	ECUV1H332KBV	0.0033	
C153	ECUV1C104KBV	0.1	
C154	ECUV1H100DCV	10p	
C155	ECUV1H561JCV	560p	S
C156	ECUV1H470JCV	47p	
C157	ECEA1HKS4R7	4.7	S
C158	ECUV1C104KBV	0.1	
C163	ERJ3GEY0R00	0	

Ref. No.	Part No.	Part Name & Description	Remarks
C164	ECUV1H221JCV	220p	S
C165	ECUV1C104ZFV	0.1	
C166	ECUV1H221JCV	220p	S
C167	ECUV1H100DCV	10p	
C168	ECUV1C273KBV	0.027	
C169	ECUV1C273KBV	0.027	
C170	ECEA0JKA331	330	
C171	ECUV1H103KBV	0.01	
C172	ECUV1H103KBV	0.01	
C173	ECUV1C104KBV	0.1	
C174	ECUV1H123KBV	0.012	
C175	ERJ3GEY0R00	0	
C176	ECUV1C104KBV	0.1	
C177	ECUV1H102KBV	0.001	
C178	ECEA1HKS100	10	S
C179	ECEA1HKS100	10	S
C180	ECUV1H103KBV	0.01	
C185	PQCUV1E104MD	0.1	S
C186	ECEA1HKS100	10	S
C188	ECEA1CK101	100	S
C189	ECUV1C104ZFV	0.1	
C190	ECUV1C104ZFV	0.1	
C191	ECEA1CK101	100	S
C192	ECEA1CK101	100	S
C193	ECUV1C104ZFV	0.1	
C194	ECUV1C104KBV	0.1	
C195	ECUV1H103KBV	0.01	
C196	ECUV1H103KBV	0.01	
C199	ECUV1H100DCV	10p	
C201	ECUV1C104KBV	0.1	
		(CONNECTORS & JACKS)	
CN101	PFJJ1T008Z	JACK/SOCKET	S
CN103	PQJP7G30Z	CONNECTOR	S
CN104	PQJS12A10Z	CONNECTOR	S
CN105	PQJS08A10Z	CONNECTOR	S
CN106	PQJP2G30Z	CONNECTOR	S
CN201	PQJJ1TB18Z	JACK/SOCKET	S
CN202	PQJP7G43Z	CONNECTOR	
		(FUSE)	
F101	PQBA1N10NMAL	FUSE	S
		(COILS)	
FLT101	PFLE003	COIL	
FLT201	PFLE126	COIL	S
L106	PQLQXD152K	COIL	S
L107	PQLQXD152K	COIL	S
L110	PQLQR2KB113T	COIL	S
L111	PQLQR2KB20T	COIL	S
L112	PQLQR2KB20T	COIL	S
L113	PQLQR2KB20T	COIL	S
L114	PQLQR2KB20T	COIL	S

Ref. No.	Part No.	Part Name & Description	Remarks
L115	PQLQR2KB20T	COIL	S
L116	PQLQR2KB20T	COIL	S
L118	PQLQR2KB20T	COIL	S
L119	PQLQR2KB20T	COIL	S
L120	PQLQR2KB113T	COIL	S
L124	PQLQR2KA20T	COIL	S
L125	PQLQR2KA20T	COIL	S
L126	PQLQR2KA20T	COIL	S
L127	PQLQR2KA20T	COIL	S
		(COMPONENTS PART)	
L101	EXCELDR35	COMPONENTS PARTS	
		CERAMIC FILTER	
L102	PFVF2B272ST	CERAMIC FILTER	S
L103	PFVF2B272ST	CERAMIC FILTER	S
L104	J0JCC0000266	CERAMIC FILTER	
L105	J0JCC0000266	CERAMIC FILTER	
		(PHOTO ELECTRIC TRANSDUCERS)	
PC101	CNC7S102	PHOTO COUPLER	⚠
PC102	PQVIPC814K	PHOTO COUPLER	⚠S
PC104	PQVITLP627	PHOTO COUPLER	⚠S
		(RESISTORS)	
J108	PQ4R10XJ000	0	S
J111	PQ4R10XJ000	0	S
J112	PQ4R10XJ000	0	S
J114	ERJ3GEY0R00	0	
L108	ERJ3GEY0R00	0	
L109	ERJ3GEY0R00	0	
L117	ERJ3GEY0R00	0	
L121	ERJ3GEY0R00	0	
L122	ERJ3GEY0R00	0	
L123	ERJ3GEY0R00	0	
L128	ERJ3GEY0R00	0	
R101	ERDS2TJ271	270	S
R102	ERJ3GEYJ222	2.2k	
R103	ERDS1TJ183	18k	S
R104	ERJ3GEYJ123	12k	
R107	ERJ3GEYJ103	10k	
R109	ERJ3GEYJ124	120k	
R110	ERJ3GEYJ124	120k	
R111	ERJ3GEYJ222	2.2k	
R112	ERDS1TJ223	22k	S
R117	ERJ3GEYJ272	2.7k	
R118	ERJ3GEYJ153	15k	
R119	ERJ3GEYJ562	5.6k	
R124	ERC14GK156	15M	
R125	ERC14GK156	15M	
R126	ERC14GK156	15M	
R127	ERC14GK156	15M	
R128	ERJ3GEYJ275	2.7M	

Ref. No.	Part No.	Part Name & Description	Remarks
R129	ERJ3GEYJ275	2.7M	
R130	ERJ3GEYJ102	1k	
R131	ERJ3GEYJ103	10k	
R132	ERJ3GEYJ393	39k	
R133	ERJ3GEYJ103	10k	
R134	ERJ3GEYJ561	560	
R135	ERJ3GEYJ821	820	
R136	ERJ3GEYJ821	820	
R137	ERJ3GEYJ561	560	
R138	ERJ3GEYJ821	820	
R139	ERJ3GEYJ682	6.8k	
R141	ERJ3GEYJ223	22k	
R142	ERJ3GEYJ223	22k	
R144	ERJ3GEYJ223	22k	
R145	ERJ3GEYJ223	22k	
R146	ERJ3GEYJ103	10k	
R147	ERJ3GEYJ103	10k	
R148	ERJ3GEYJ103	10k	
R149	ERJ3GEYJ103	10k	
R150	ERJ3GEYJ103	10k	
R151	ERJ3GEYJ103	10k	
R152	ERJ3GEYJ103	10k	
R153	ERJ3GEYJ103	10k	
R154	ERJ3GEYJ222	2.2k	
R155	ERJ3GEYJ224	220k	
R156	ERJ3GEYJ224	220k	
R157	ERJ3GEYJ513	51k	
R158	ERJ3GEYJ334	330k	
R159	ERJ3GEYJ563	56k	
R160	ERJ3GEYJ684	680k	
R161	ERJ3GEYJ105	1M	
R162	ERJ3GEYJ105	1M	
R163	ERJ3GEYJ682	6.8k	
R173	ERJ3GEYJ103	10k	
R174	ERJ3GEYJ222	2.2k	
R175	ERJ3GEYJ224	220k	
R176	ERJ3GEYJ224	220k	
R177	ERJ3GEYJ223	22k	
R178	ERJ3GEYJ223	22k	
R179	ERJ3GEYJ331	330	
R180	ERJ3GEYJ152	1.5k	
R181	ERJ3GEYJ152	1.5k	
R182	ERJ3GEYJ103	10k	
R183	ERJ3GEYJ472	4.7k	
R184	ERJ3GEYJ222	2.2k	
R185	ERJ3GEY0R00	0	
R188	ERJ3GEYJ102	1k	
R189	ERJ3GEYJ473	47k	
R190	ERJ3GEYJ220	22	
R191	ERJ3GEYJ331	330	

Ref. No.	Part No.	Part Name & Description	Remarks
R192	ERJ3GEY0R00	0	
R201	ERJ3GEYJ103	10k	
R202	ERJ3GEYJ103	10k	
R203	ERJ3GEYJ103	10k	
R204	ERJ3GEYJ123	12k	
R205	ERJ3GEYJ822	8.2k	
R206	ERJ3GEYJ472	4.7k	
R207	ERJ3GEYJ101	100	
R208	ERJ3GEYJ472	4.7k	
R209	ERJ3GEYJ101	100	
R210	ERJ3GEYJ472	4.7k	
R211	ERJ3GEYJ472	4.7k	
R212	ERJ3GEYJ102	1k	
R213	ERJ3GEYJ103	10k	
R214	ERJ3GEYJ103	10k	
		(RELAY)	
RL101	PFSL003Z	RELAY	⚠S
		(VARISTORS)	
SA101	PFRZRA311P6T	VARISTOR	S
SA102	PFRZ001Z	VARISTOR	⚠S
ZNR101	ERZVA7D151	VARISTOR	
		(TRANSFORMERS)	
T101	PFLT8E003	TRANSFORMER	⚠S
T102	PFLT8E004	TRANSFORMER	⚠S

12.4. OPERATION BOARD PARTS

Ref. No.	Part No.	Part Name & Description	Remarks
PCB3	PFWP2FP145E	OPERATION BOARD ASS'Y (RTL)	
PCB3-1	K0L1BA000095	SWITCH,ACTUATOR (SW352)	
PCB3-2	K0L1BA000094	SWITCH,ACTUATOR (SW353)	
		(IC)	
IC301	C1ZBZ0002089	IC	
		(TRANSISTOR)	
Q351	2SD1819A	TRANSISTOR(SI)	S
		(DIODE)	
LED301	LNJ801LPDJA	DIODE(SI)	
		(CONNECTOR)	
CN301	PQJP10G43Z	CONNECTOR,10P	
		(LIQUID CRYSTAL DISPLAY)	
CN302	L5DAAFB00001	LCD	
		(RESISTORS)	
L351	ERJ3GEY0R00	0	
L352	ERJ3GEY0R00	0	
R302	ERJ3GEYJ471	470	
R303	ERJ3GEYJ183	18k	
R305	ERJ3GEYJ222	2.2k	
R306	ERJ3GEYJ222	2.2k	
R307	ERJ3GEYJ821	820	
R312	ERJ3GEYJ271	270	
R314	ERJ3GEYJ472	4.7k	
R315	ERJ3GEYJ101	100	
R316	ERJ3GEYJ472	4.7k	
R317	ERJ3GEYJ101	100	
R318	ERJ3GEYJ4R7	4.7	
R319	ERJ3GEYJ821	820	
R351	ERJ3GEYJ331	330	
R352	ERJ3GEYJ222	2.2k	
R353	ERJ3GEYJ223	22k	
R354	ERJ3GEYJ151	150	
R355	ERJ3GEYJ564	560k	
R356	ERJ3GEYJ332	3.3k	
		(CAPACITORS)	
C302	ECUV1C104KBV	0.1	S
C303	ECEA0JKS101	100	S
C304	ECUV1H103KBV	0.01	S
C305	ECUV1H101JCV	100p	S
C308	ECUV1H331JCV	330p	S
C309	ECUV1H331JCV	330p	S
C310	ECUV1C104KBV	0.1	S
C311	ECUV1C104KBV	0.1	S
C314	ECUV1C104KBV	0.1	S
C316	ECUV1H103KBV	0.01	S
C317	ECUV1H103KBV	0.01	S
C351	ECEA0JKS101	100	S
C352	ECUV1H103KBV	0.01	S
C353	ECUV1H682KBV	0.0068	S
C354	ECUV1H331JCV	330p	S

Ref. No.	Part No.	Part Name & Description	Remarks
		(SWITCHES)	
SW301	PQSH1A105Z	SWITCH	S
SW302	PQSH1A105Z	SWITCH	S
SW303	PQSH1A105Z	SWITCH	S
SW304	PQSH1A105Z	SWITCH	S
SW305	PQSH1A105Z	SWITCH	S
SW306	PQSH1A105Z	SWITCH	S
SW307	PQSH1A105Z	SWITCH	S
SW308	PQSH1A105Z	SWITCH	S
SW309	PQSH1A105Z	SWITCH	S
SW310	PQSH1A105Z	SWITCH	S
SW311	PQSH1A105Z	SWITCH	S
SW312	PQSH1A105Z	SWITCH	S
SW313	PQSH1A105Z	SWITCH	S
SW314	PQSH1A105Z	SWITCH	S
SW315	PQSH1A105Z	SWITCH	S
SW316	PQSH1A105Z	SWITCH	S
SW317	PQSH1A105Z	SWITCH	S
SW318	PQSH1A105Z	SWITCH	S
SW319	PQSH1A105Z	SWITCH	S
SW320	PQSH1A105Z	SWITCH	S
SW321	PQSH1A105Z	SWITCH	S
SW322	PQSH1A105Z	SWITCH	S
SW323	PQSH1A105Z	SWITCH	S
SW324	PQSH1A105Z	SWITCH	S
SW325	PQSH1A105Z	SWITCH	S
SW326	PQSH1A105Z	SWITCH	S
SW327	PQSH1A105Z	SWITCH	S
SW328	PQSH1A105Z	SWITCH	S
SW329	PQSH1A105Z	SWITCH	S
SW330	PQSH1A105Z	SWITCH	S
SW331	PQSH1A105Z	SWITCH	S

12.5. POWER SUPPLY BOARD PARTS

Ref. No.	Part No.	Part Name & Description	Remarks
PCB4	N0AC2GJ00002	POWER SUPPLY BOARD ASS'Y (RTL)	⚠
		(ICs)	
IC101	PFVIKA7552	IC	
IC201	AN1431T	IC	S
IC202	AN7805F	IC	S
		(TRANSISTOR)	
Q101	2SK2717	TRANSISTOR(SI)	
		(DIODES)	
D101	PFVD1N4005	DIODE(SI)	
D102	PFVD1N4005	DIODE(SI)	
D103	PFVD1N4005	DIODE(SI)	
D104	PFVD1N4005	DIODE(SI)	⚠
D105	PFVDEG01C	DIODE(SI)	
D106	MA165	DIODE(SI)	S
D107	MA4220	DIODE(SI)	S
D108	PQVDERA1802	DIODE(SI)	S
D201	PFVDSF5LC20U	DIODE(SI)	S
D202	PFVD11DQ10	DIODE(SI)	
		(COIL)	
L101	ELF15N005A	COIL	
		(COMPONENTS PART)	
L103	EXCELDR35	COMPONENTS PART	S
		(CONNECTORS)	
CN31	PQJP2D98Z	CONNECTOR,2P	⚠
CN301	PQJP7G30Z	CONNECTOR,7P	⚠S
		(FUSE)	
F101	PFBAHU215315	FUSE	⚠S
		(PHOTO ELECTRIC TRANSDUCER)	
PC101	0N3171	PHOTO COUPLER	⚠S
		(THERMISTOR)	
TH101	PFRT57235S80	THERMISTOR	S
		(TRANSFORMER)	
T101	PFLTSRW2929E	TRANSFORMER	
		(VARIABLE RESISTOR)	
VR201	EVNDXAA03B53	VARIABLE RESISTOR	S
		(VARISTOR)	
ZNR10	ERZV10DK751U	VARISTOR	⚠S
		(RESISTORS)	
R101	ERDS1J105	1M	
R102	ERDS2TJ394	390k	
R103	ERDS2TJ394	390k	
R104	ERG2SJ304	300k	
R105	ERX2SJR22	0.22	
R106	ERG2SJ470	47	
R107	ERG2SJ304	300k	
R108	ERDS1FTJ150	15	
R109	ERDS2TJ100	10	
R121	ERJ3GEYJ103	10k	S

Ref. No.	Part No.	Part Name & Description	Remarks
R122	ERDS2TJ271	270	
R124	ERJ3GEYJ181	180	S
R125	ERJ3GEYJ103	10k	S
R126	ERJ3GEYF562	5.6k	S
R127	ERJ3GEYJ182	1.8k	S
R128	PQ4R10XJ101	100	S
R136	ERDS2TJ104	100k	
R137	ERDS2TJ104	100k	
R203	ERDS1FVJ470	47	
R221	ERJ3GEYJ222	2.2k	S
R222	ERJ3GEYJ222	2.2k	S
R223	ERJ3GEYJ101	100	S
R224	ERJ3GEYJ273	27k	S
R225	ERJ3GEYJ332	3.3k	S
		(CAPACITORS)	
C101	ECQU2A224MV	0.22	⚠S
C102	ECQU2A104MV	0.1	⚠S
C103	PFKD2E3KH102	0.001	S
C105	PFKD2E3KH222	0.0022	S
C106	PFCEA400SX56	56	S
C108	ECKD3A102KBP	0.001	S
C109	PFCEA35A47M	47	S
C110	PFKDD2GA222M	0.0022	S
C119	ECKD3A470KBP	47p	S
C121	ECUV1H472KBV	0.0047	S
C122	ECUV1A224KBV	0.22	S
C123	ECUV1H561JCV	560p	S
C124	ECUV1E104KBV	0.1	S
C201	PFCEA35F471	470	S
C202	ECKD3A102KBP	0.001	S
C203	PFCEA16A470	470	S
C204	PFCEA35A47M	47	S
C205	PFCEA50A47M	0.47	S
C206	ECKD3A102KBP	0.001	S
C221	ECUV1E104KBV	0.1	S
C222	ECJ2VB1H104K	0.1	S

12.6. HOOK SWITCH BOARD

Ref. No.	Part No.	Part Name & Description	Remarks
PCB5	PFLP1515EZ-B	HOOK SWITCH BOARD ASS'Y (RTL)	
		(COIL)	
FLT201	PFLE126	COIL	S
		(JACK & CONNECTOR)	
CN201	PQJJ1TB18Z	JACK	S
CN202	PQJP7G43Z	CONNECTOR	
		(SWITCHES)	
PCB5-1	PFSH1A011Z	SWITCH (SW201)	
PCB5-2	K0L1BA000093	SWITCH (SW202)	

12.7. REED SWITCH BOARD

Ref. No.	Part No.	Part Name & Description	Remarks
PCB6	PFWP3FP141E	REED SWITCH BOARD ASS'Y (RTL)	
		(CONNECTOR)	
PCB6-2	PFJS02Q89Z	CONNECTOR	
		(SWITCH)	
PCB6-1	K0MA11000030	REED SWITCH	S

12.8. OPEN SENSOR BOARD

Ref. No.	Part No.	Part Name & Description	Remarks
PCB7	PFWP4FP141E	OPEN SENSOR BOARD ASS'Y (RTL)	
		(CONNECTOR)	
PCB7-1	PFJS02Q94ZHW	CONNECTOR	
		(SWITCH)	
SW102	PFSH1A008Z	SWITCH	

12.9. FIXTURES AND TOOLS

Ref. No.	Part No.	Part Name & Description	Remarks
EC1	PQZZ2K6Z	CONNECTOR, 2P	
EC2	PQZZ7K5Z	CONNECTOR, 7P	
EC3	PQZZ12K8Z	CONNECTOR, 12P	
EC4	PFZZ5K13Z	CONNECTOR, 5P	
EC5	PQZZ7K5Z	CONNECTOR, 7P	
EC6	PQZZ10K13Z	CONNECTOR, 10P	
EC7	PFZZ12K5Z	CONNECTOR, 12P	
EC8	PFZZ8K3Z	CONNECTOR, 8P	
	KM79811245C0	BASIC FACSIMILE TECHNIQUE	
		(for training service technicians)	

Note:

Tools and Extension Cords are useful for servicing.
(They make servicing easy.)

MEMO

13. PRINTED CIRCUIT BOARD

13.1. DIGITAL BOARD

13.1.1. COMPONENT VIEW

13.1.2. BOTTOM VIEW

13.2. ANALOGUE BOARD

13.2.1. BOTTOM VIEW

13.2.2. COMPONENT VIEW

13.3. OPERATION BOARD

13.4. POWER SUPPLY BOARD

13.5. HOOK SWITCH BOARD

13.6. REED SWITCH BOARD

13.7. OPEN SENSOR BOARD

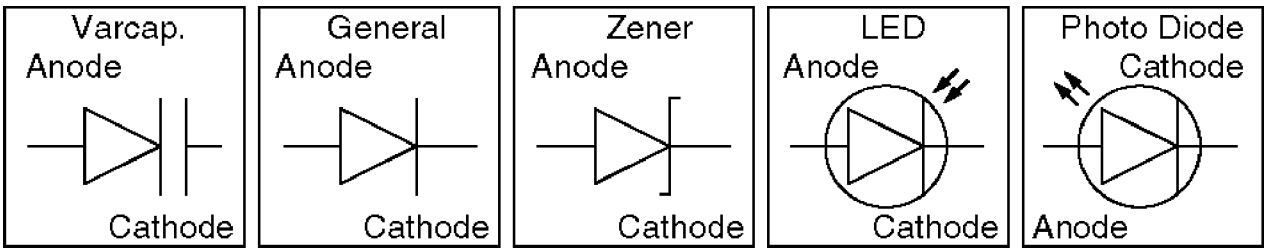
14. FOR THE SCHEMATIC DIAGRAMS

Note:

1. DC voltage measurements are taken with an oscilloscope or a tester with a ground.

2. The schematic diagrams and circuit board may be modified at any time with the development of new technology.

3.



Important safety notice
Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components, use only the manufacturer's specified parts.

15. SCHEMATIC DIAGRAM

15.1. DIGITAL BOARD

15.2. ANALOG BOARD

15.3. OPERATION BOARD

15.4. POWER SUPPLY BOARD

15.5. HOOK SWITCH BOARD

15.6. REED SWITCH BOARD

15.7. OPEN SENSOR BOARD

HI
KXFP145G

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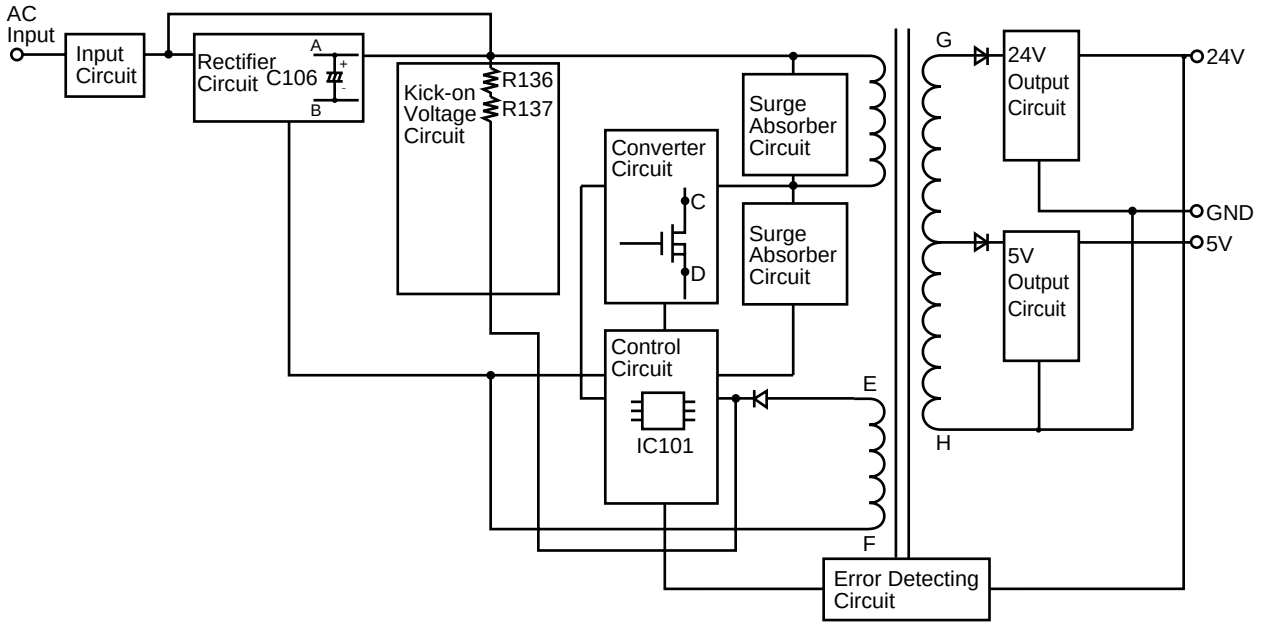
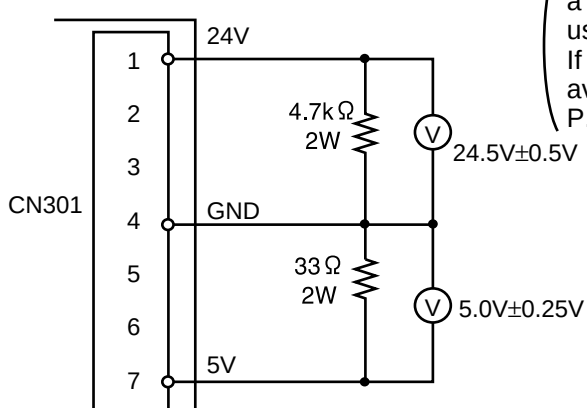
POWER SUPPLY BLOCK DIAGRAM

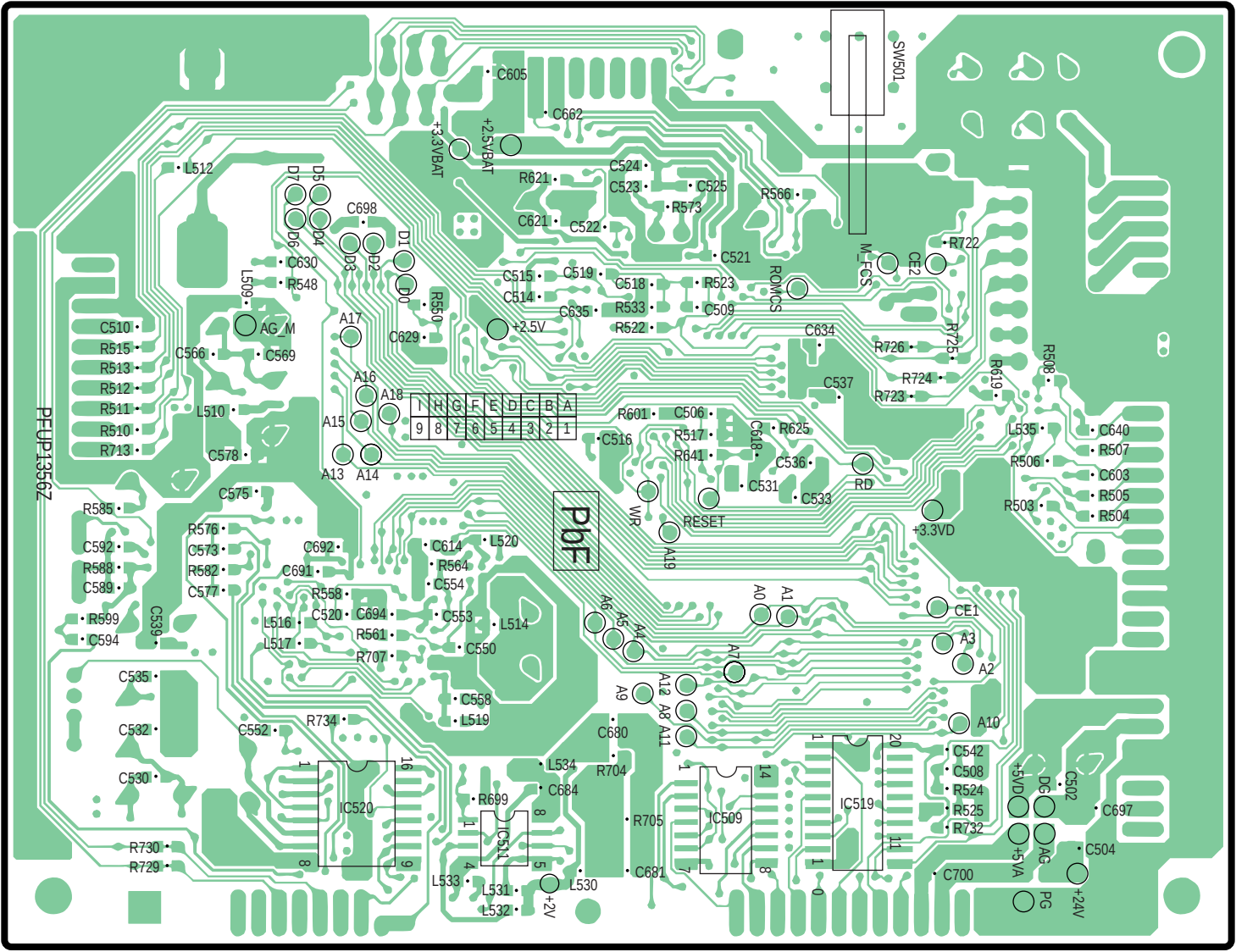


DUMMY LOAD to check voltage

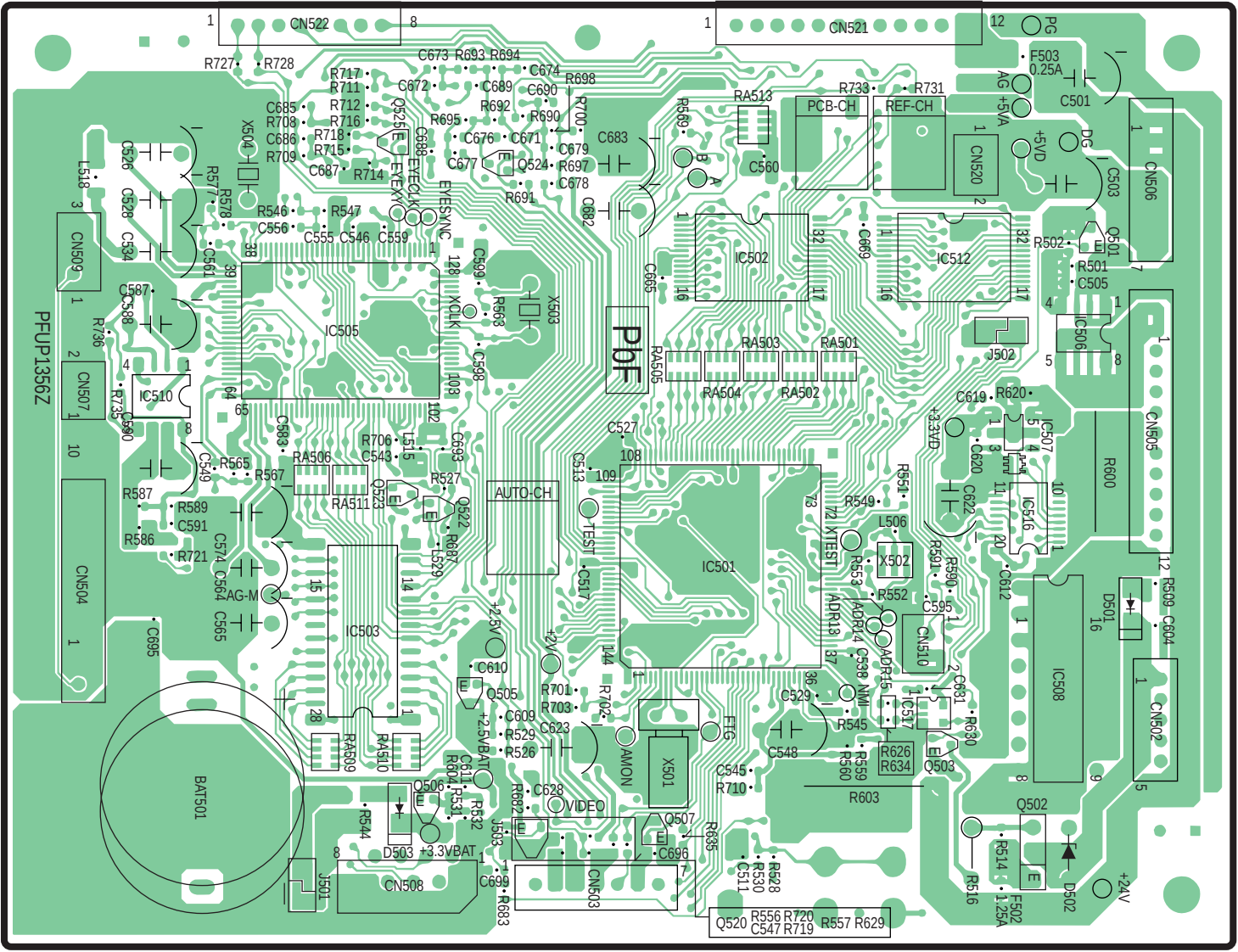


When you check voltage in a power supply unit alone, use this dummy load. If the dummy load is not available, connect the main P.C.B. to the analog P.C.B.

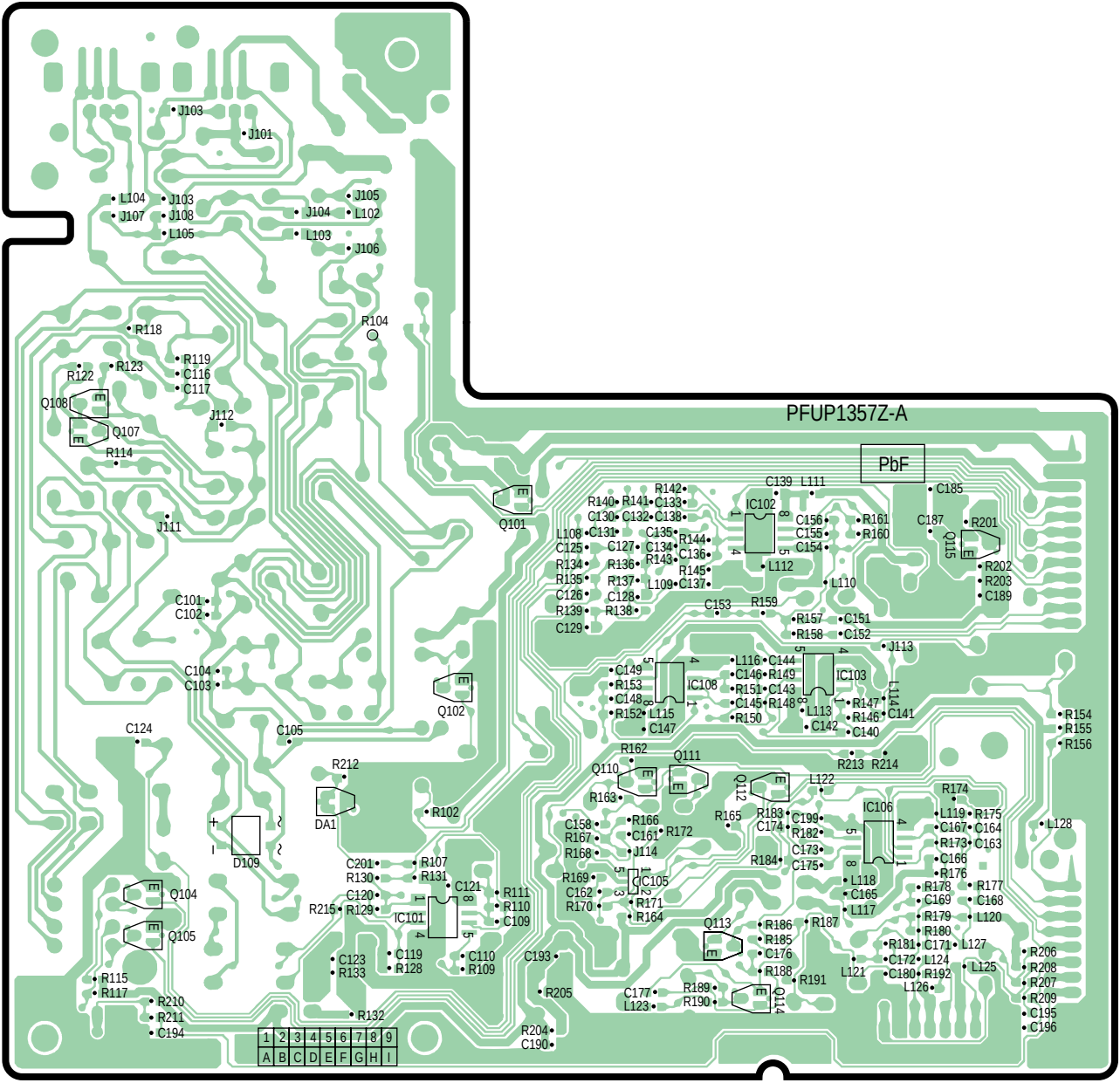
Ⓥ : Volt Meter



KX-FP145G DIGITAL BOARD (BOTTOM)



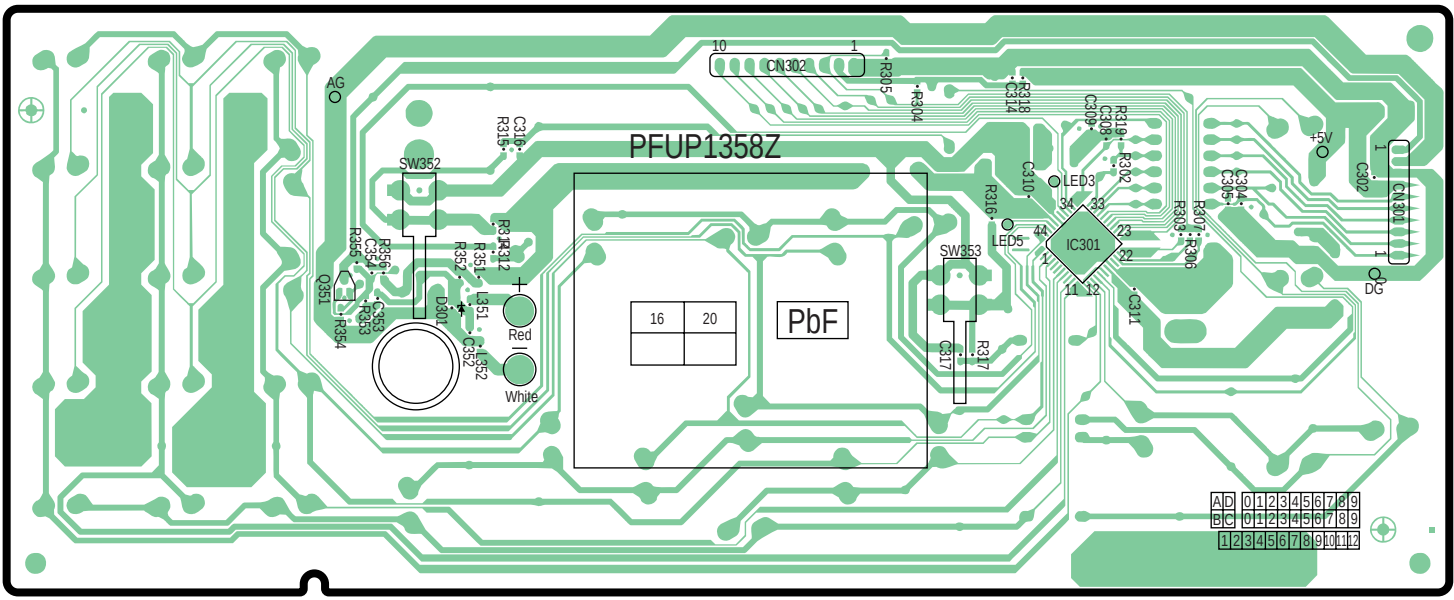
KX-FP145G DIGITAL BOARD (COMPONENT)



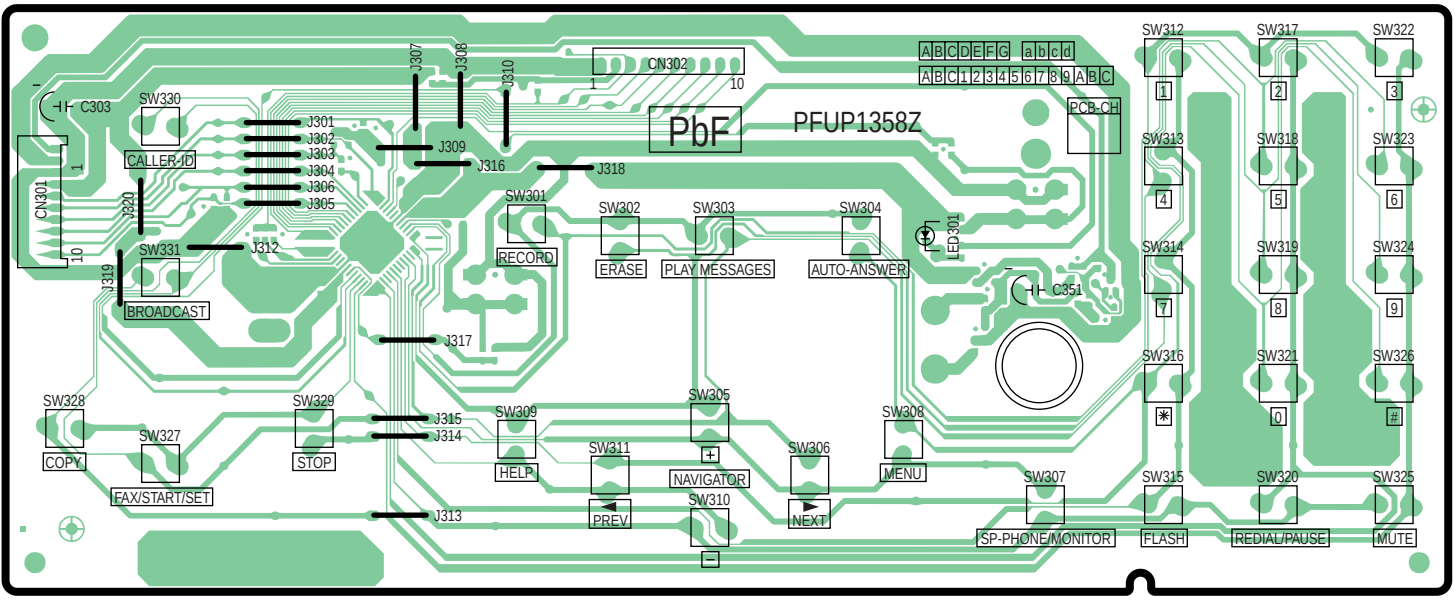
KX-FP145G ANALOG BOARD (BOTTOM)

KX-FP145G ANALOG BOARD (COMPONENT)

(BOTTOM VIEW)

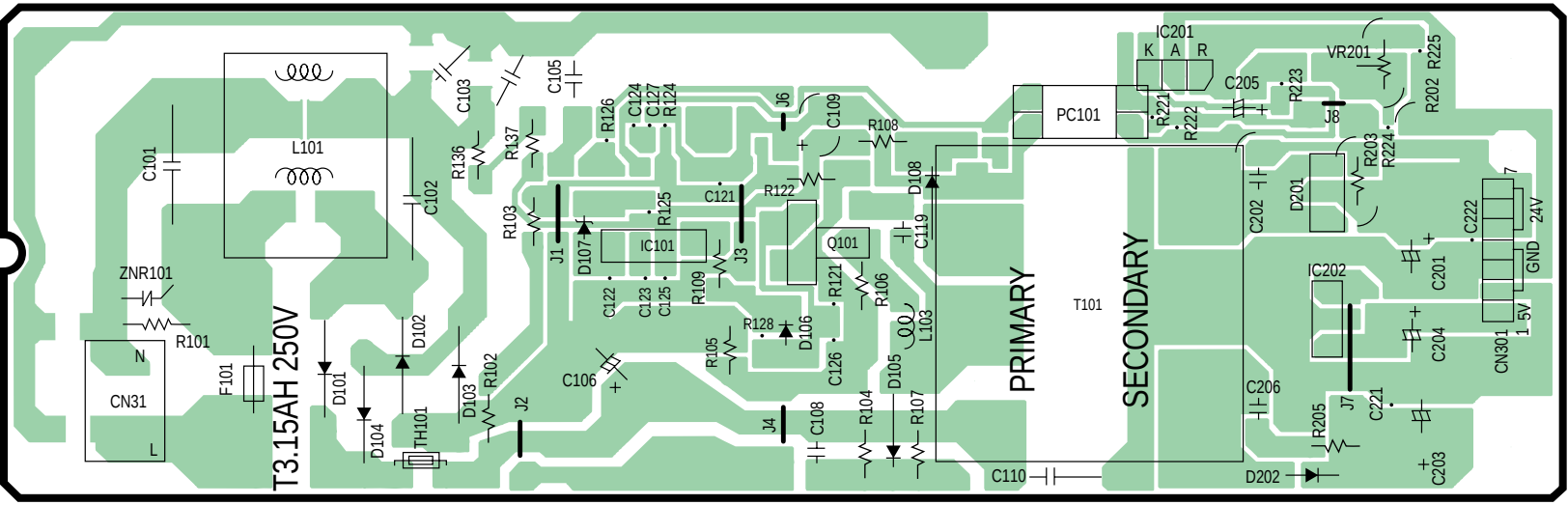


(COMPONENT VIEW)

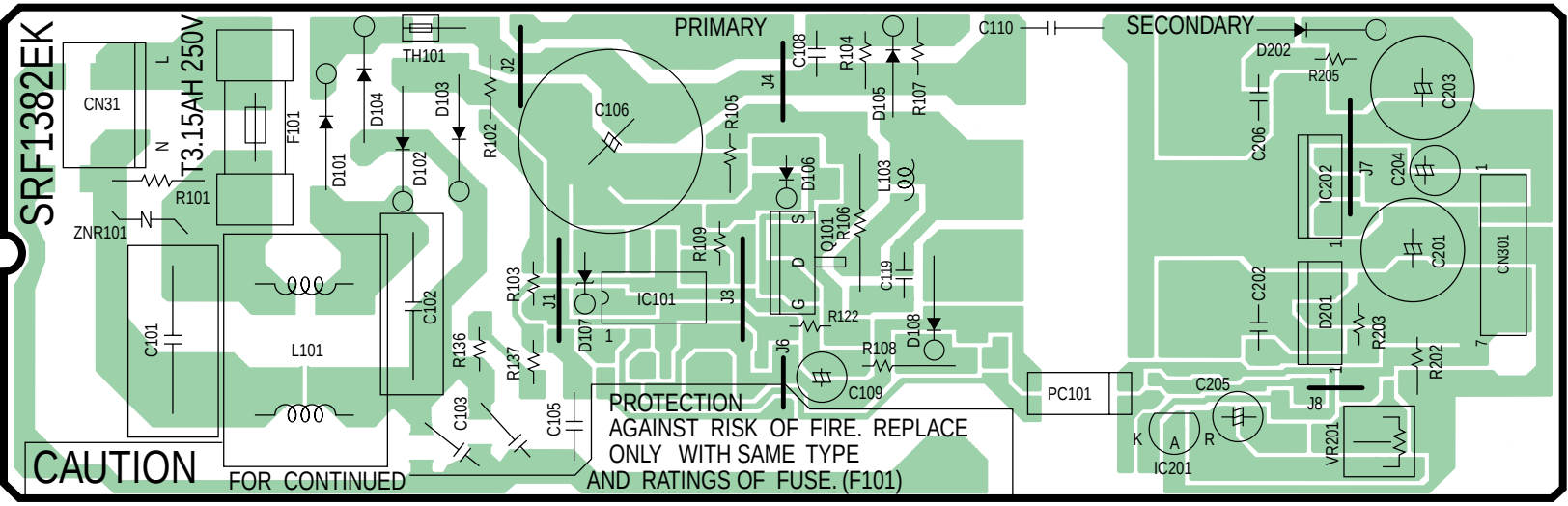


KX-FP145G OPERATION BOARD

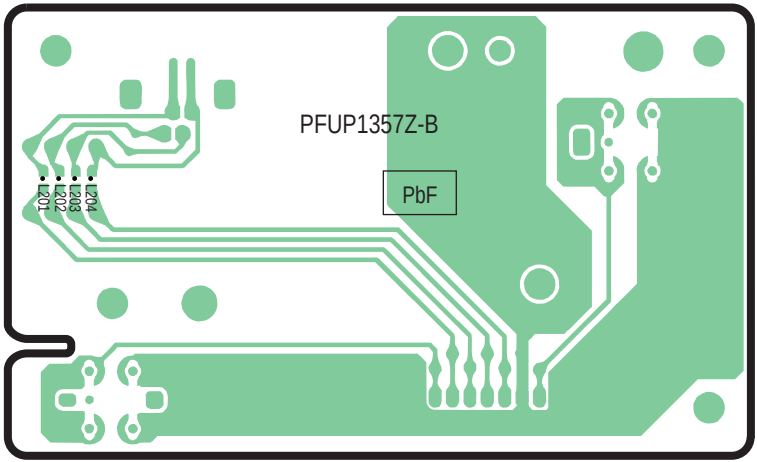
(BOTTOM VIEW)



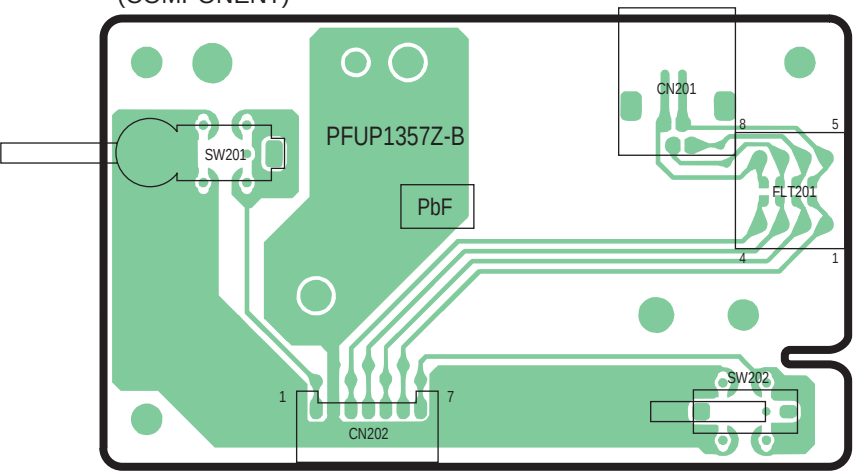
(COMPONENT VIEW)



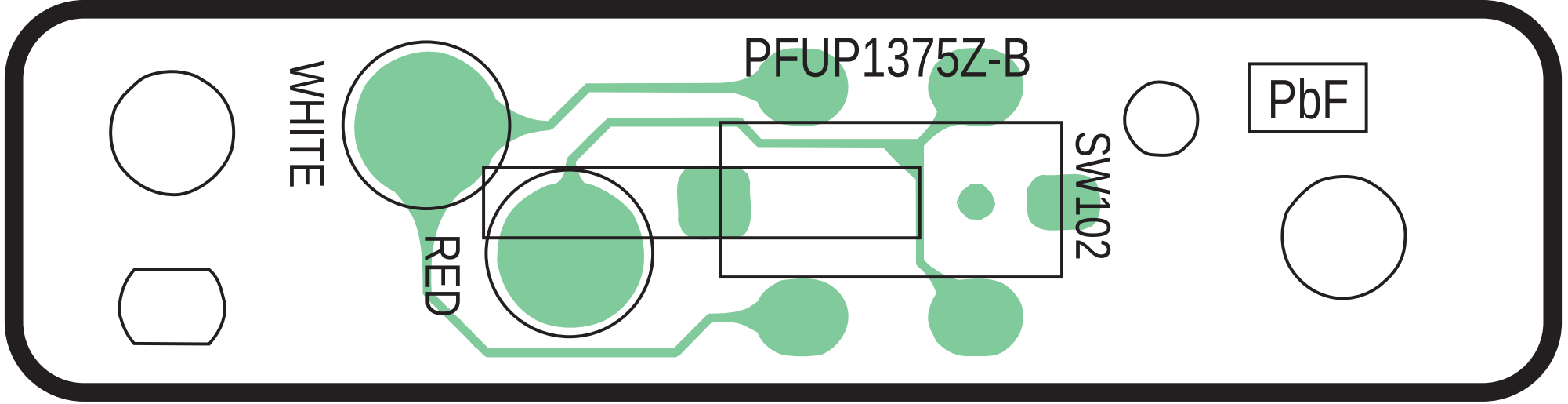
(BOTTOM)

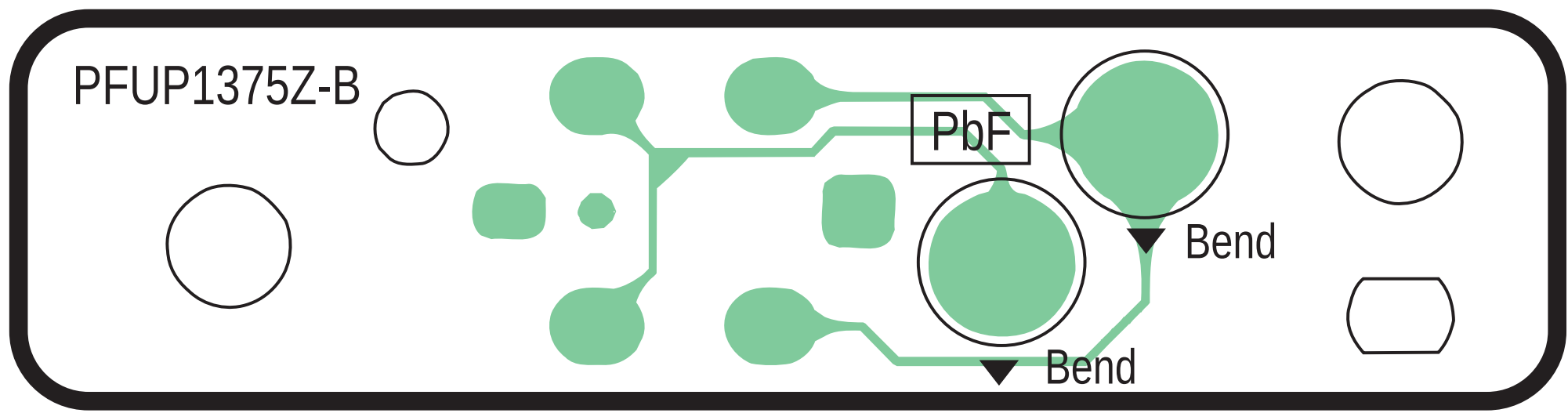


(COMPONENT)

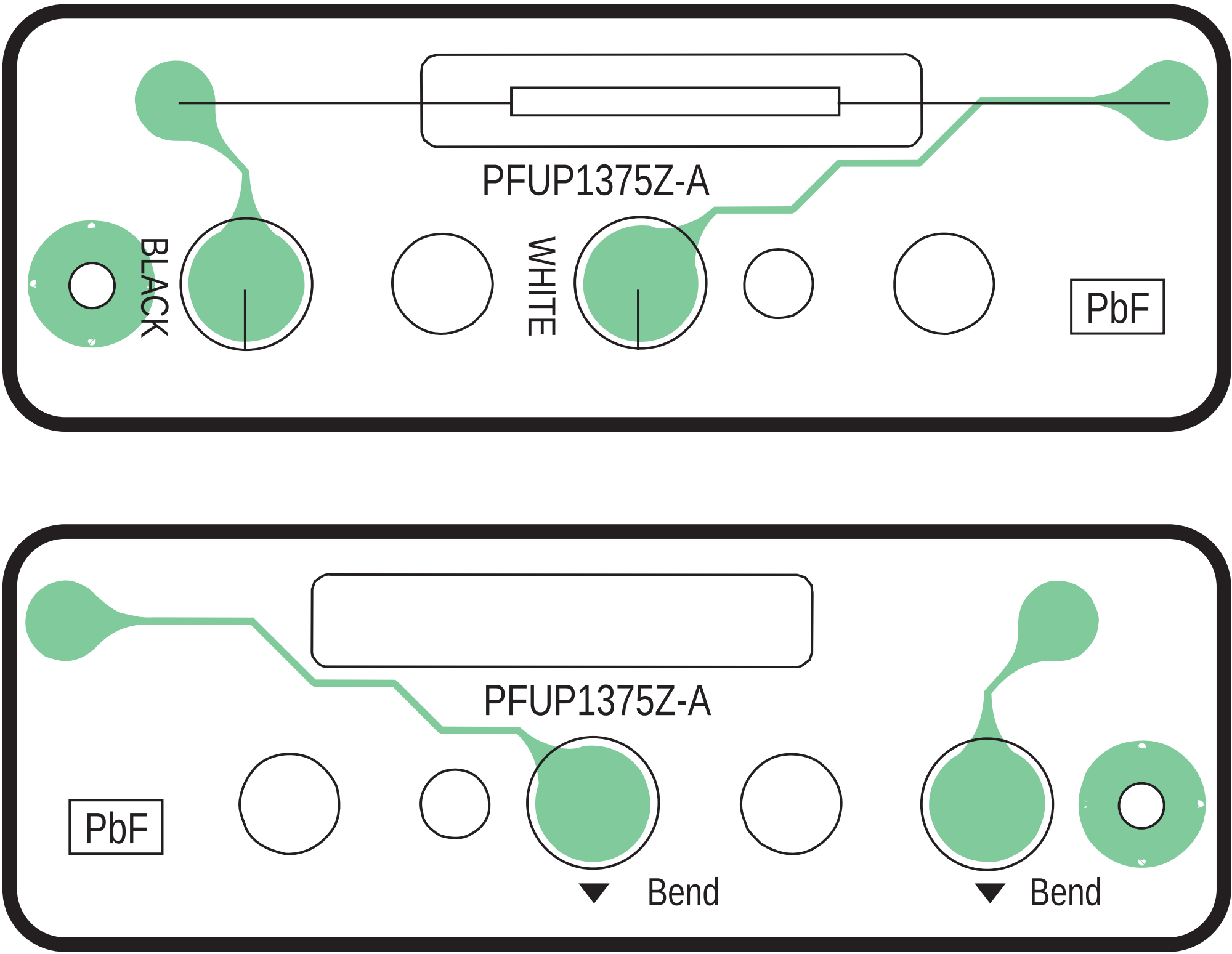


KX-FP145G HOOK SWITCH BOARD

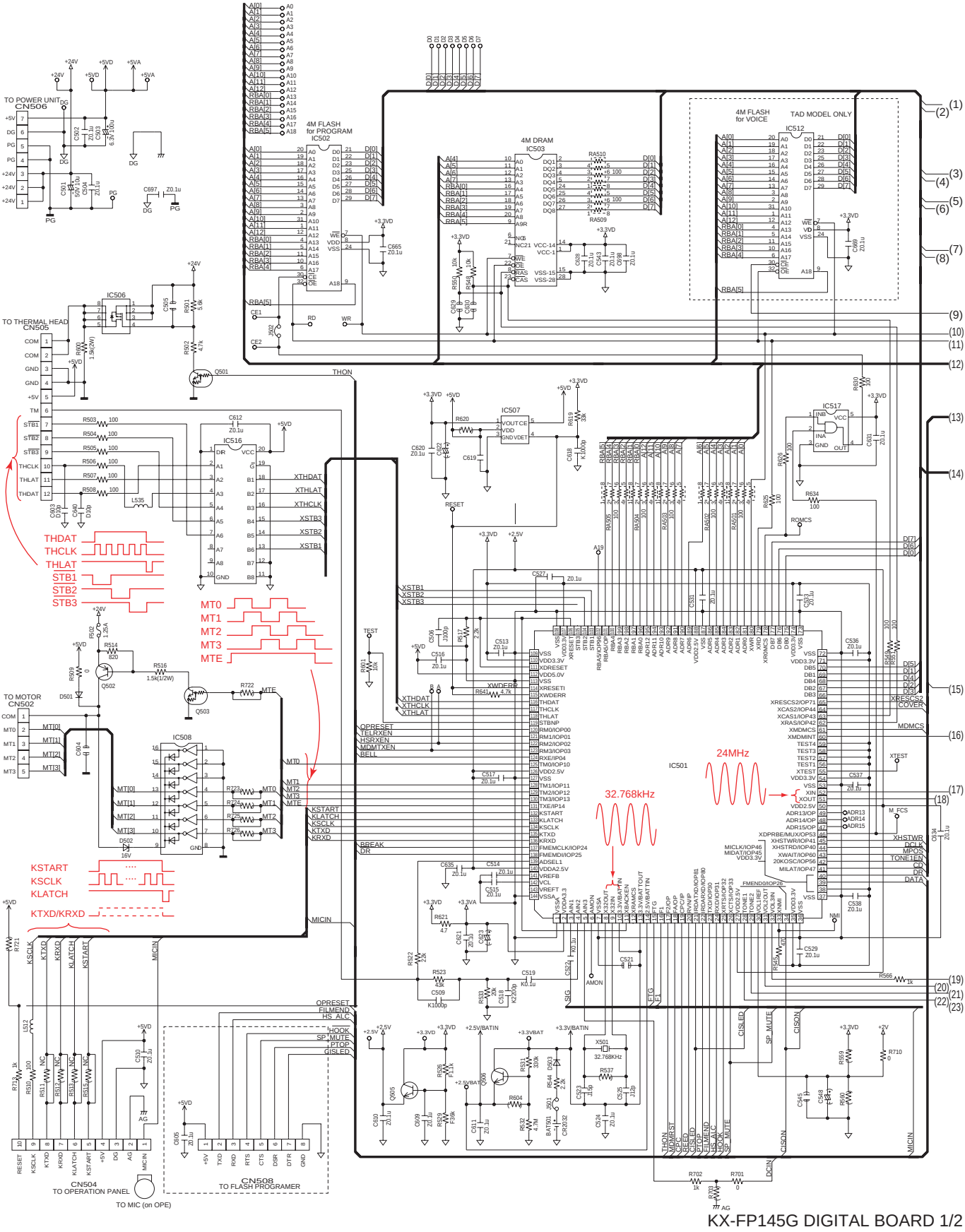


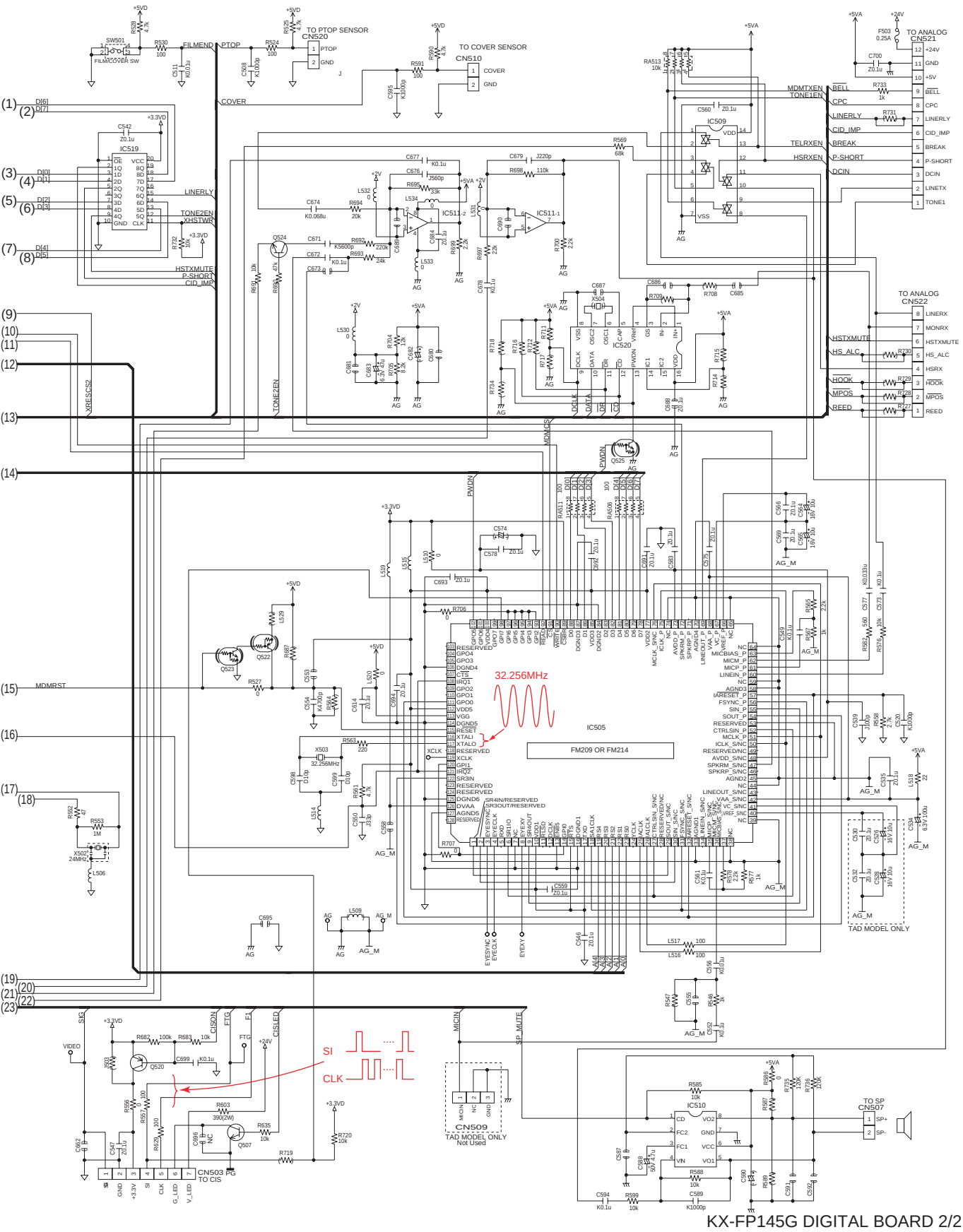


KX-FP145G OPEN SENSOR BOARD

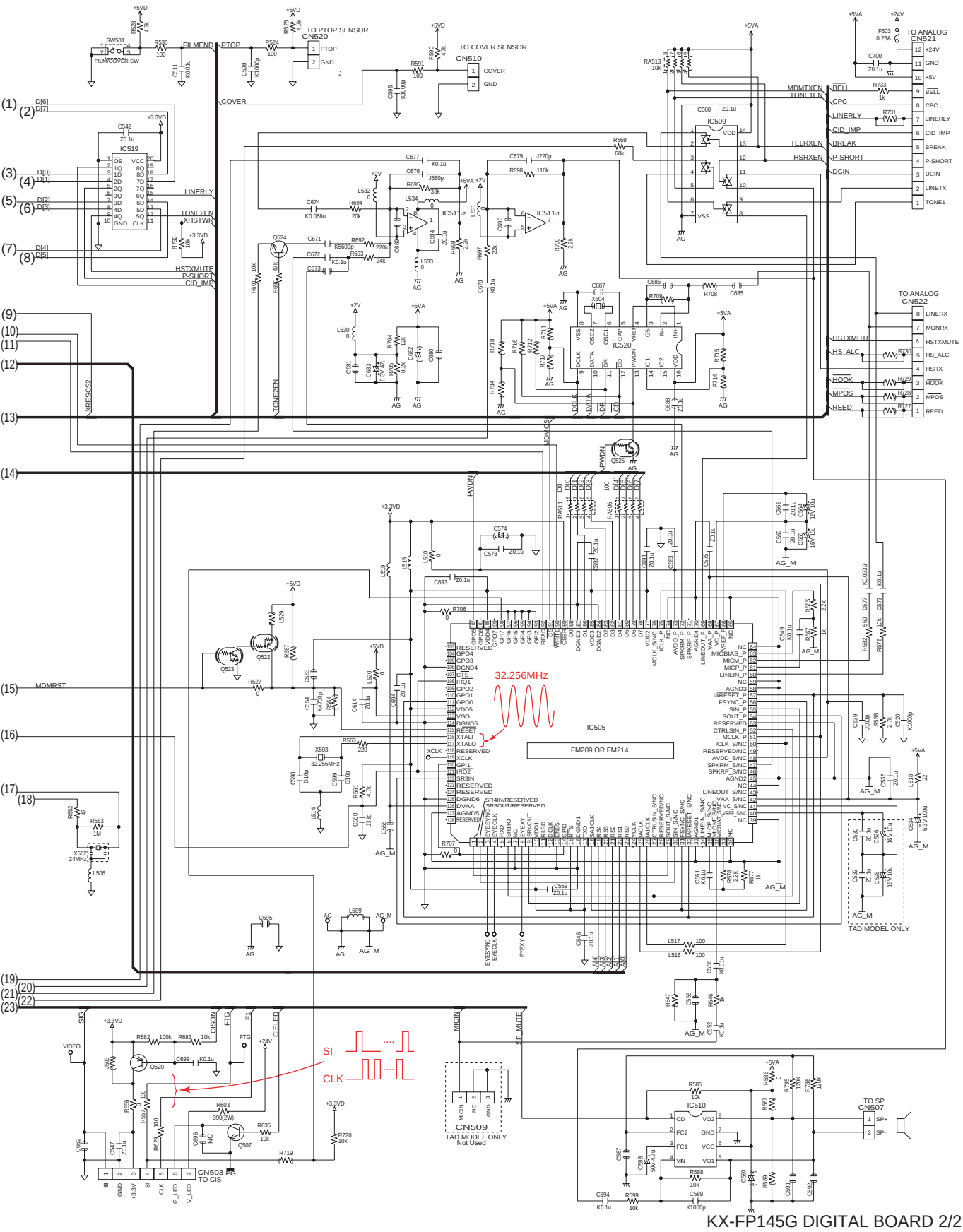


KX-FP145G REED SWITCH BOARD

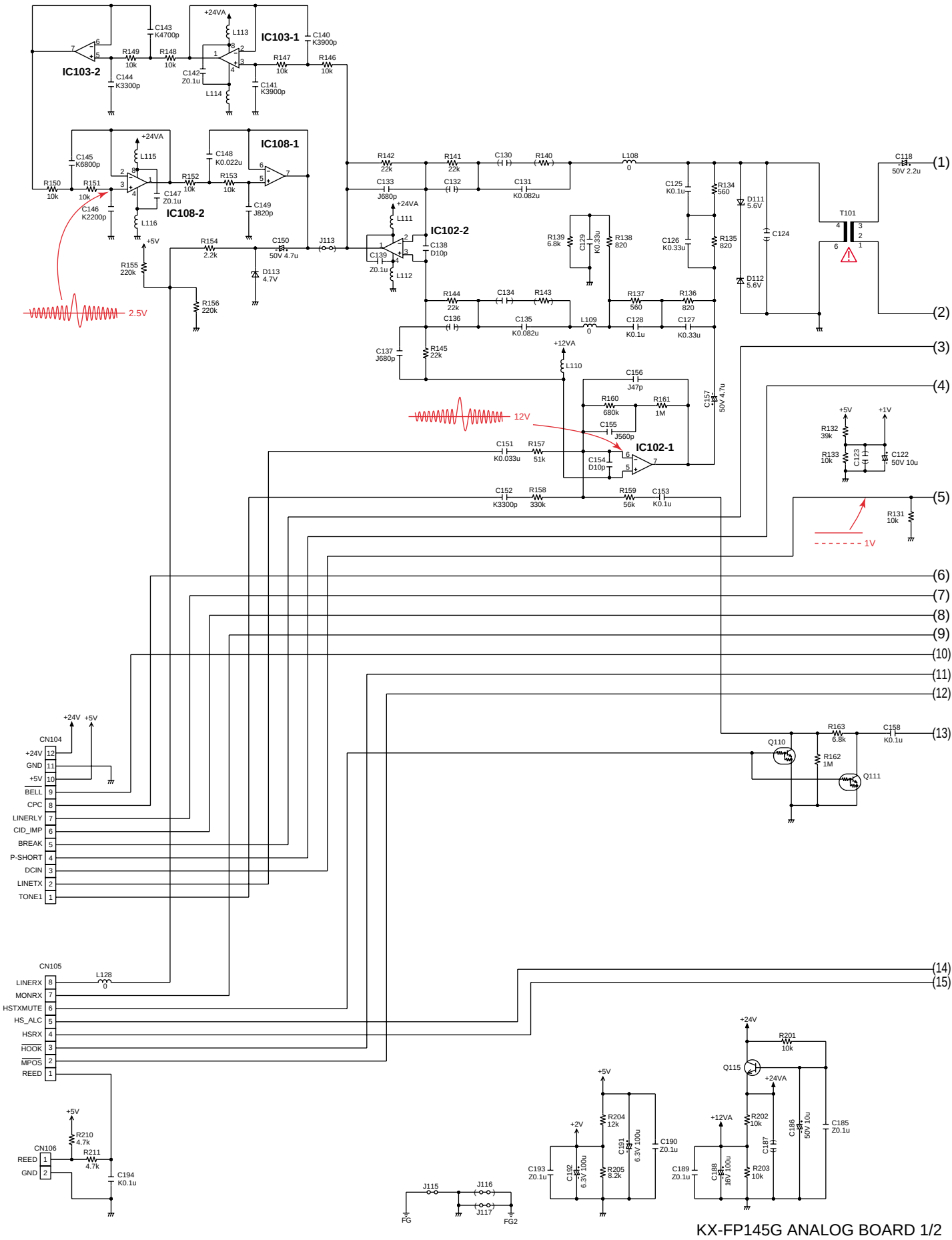

TO POWER UNIT CN506
TO THERMAL HEAD CN505
TO MOTOR CN502
CN504 TO OPERATION PANEL
TO MIC (on OPE)
CN508 TO FLASH PROGRAMER
4M FLASH for PROGRAM IC502
4M DRAM IC503
4M FLASH for VOICE
TAD MODEL ONLY IC512
IC506
IC507
IC508
IC516
IC517
IC501
THDAT
THCLK
THLAT
STB1
STB2
STB3
MT0
MT1
MT2
MT3
MTE
KSTART
KSCLK
KLATCH
KTXD/KRXD
24MHz
32.768kHz
THON
TEST
XWDERR
OPRESET
TELRXEN
HSRXEN
MDMTXEN
BELL
BREAK
DR
MICIN
AMON
OPRESET
FILMEND
HS_ALC
HOOK
SP_MUTE
PTOP
CISLED
CISON
DCIN
KX-FP145G DIGITAL BOARD 1/2



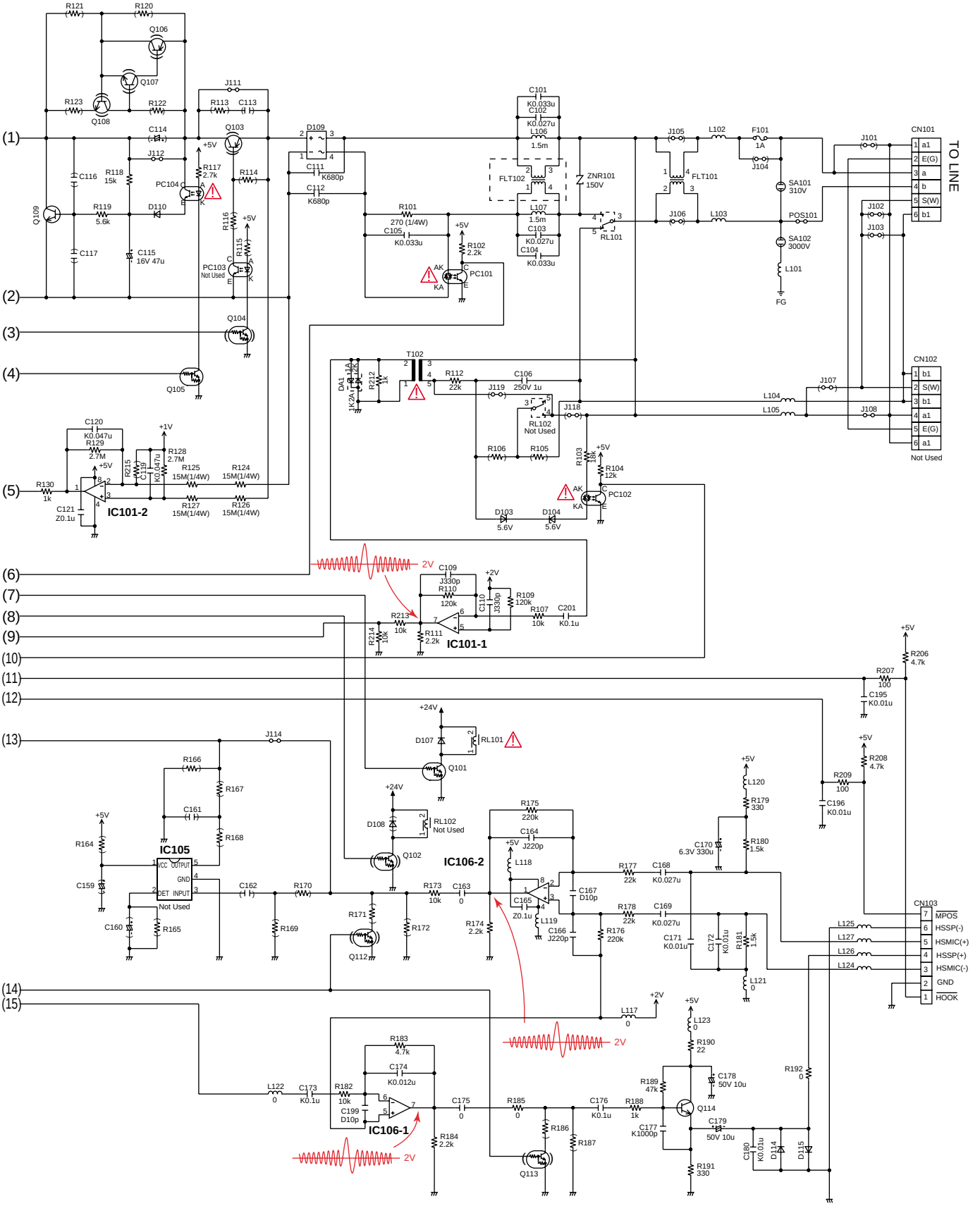
KX-FP145G DIGITAL BOARD 2/2

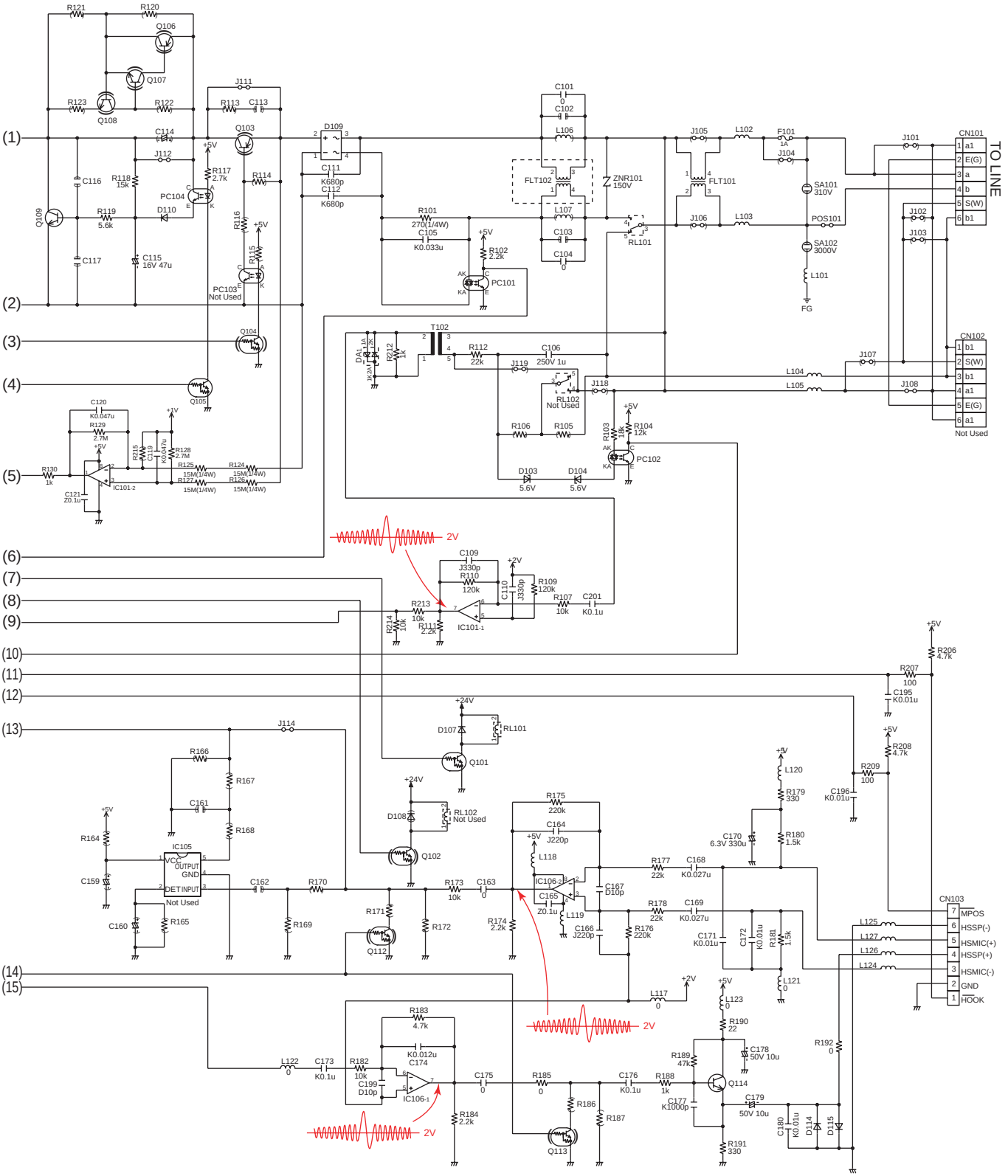


KX-FP145G DIGITAL BOARD 2/2

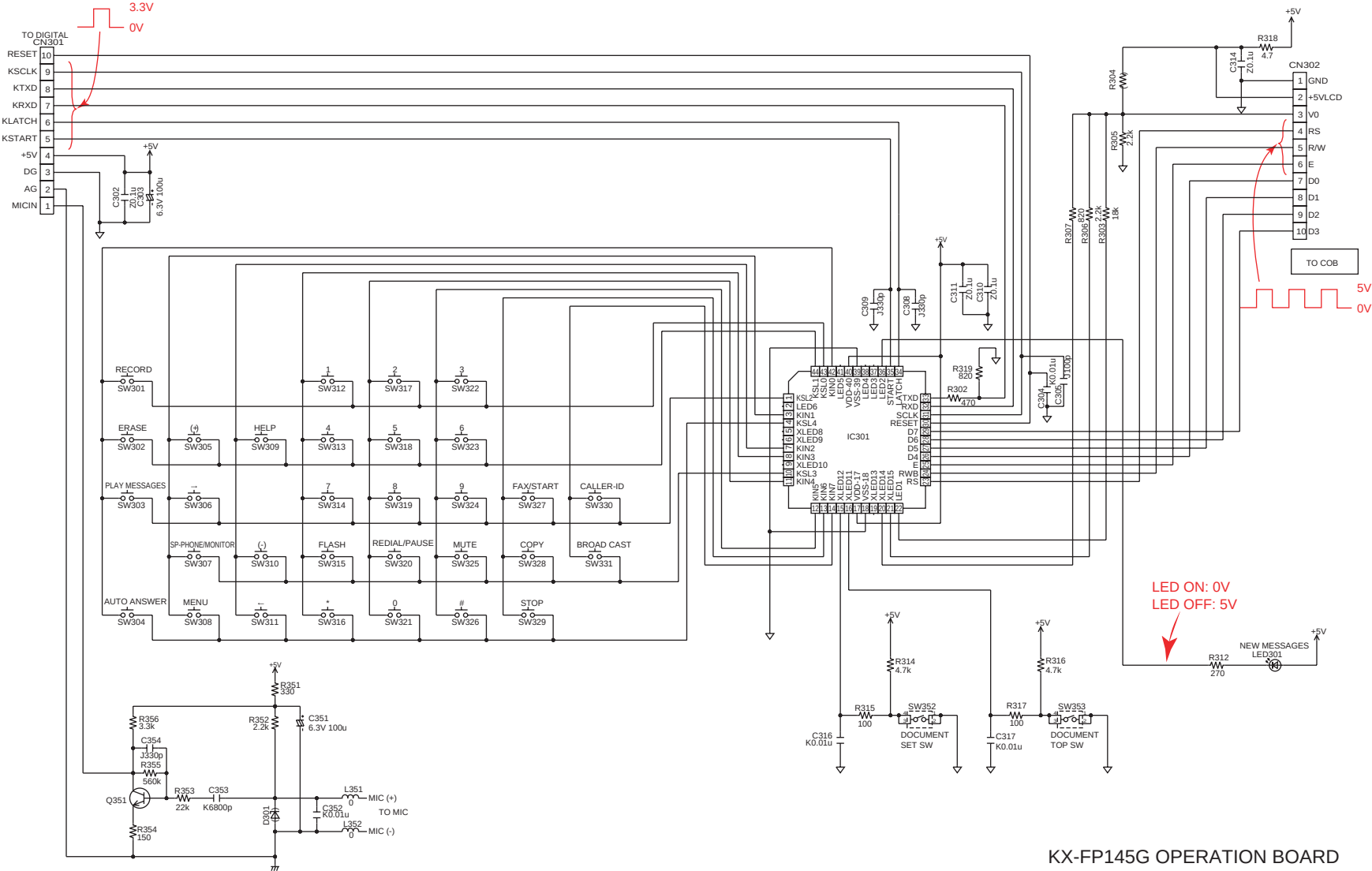


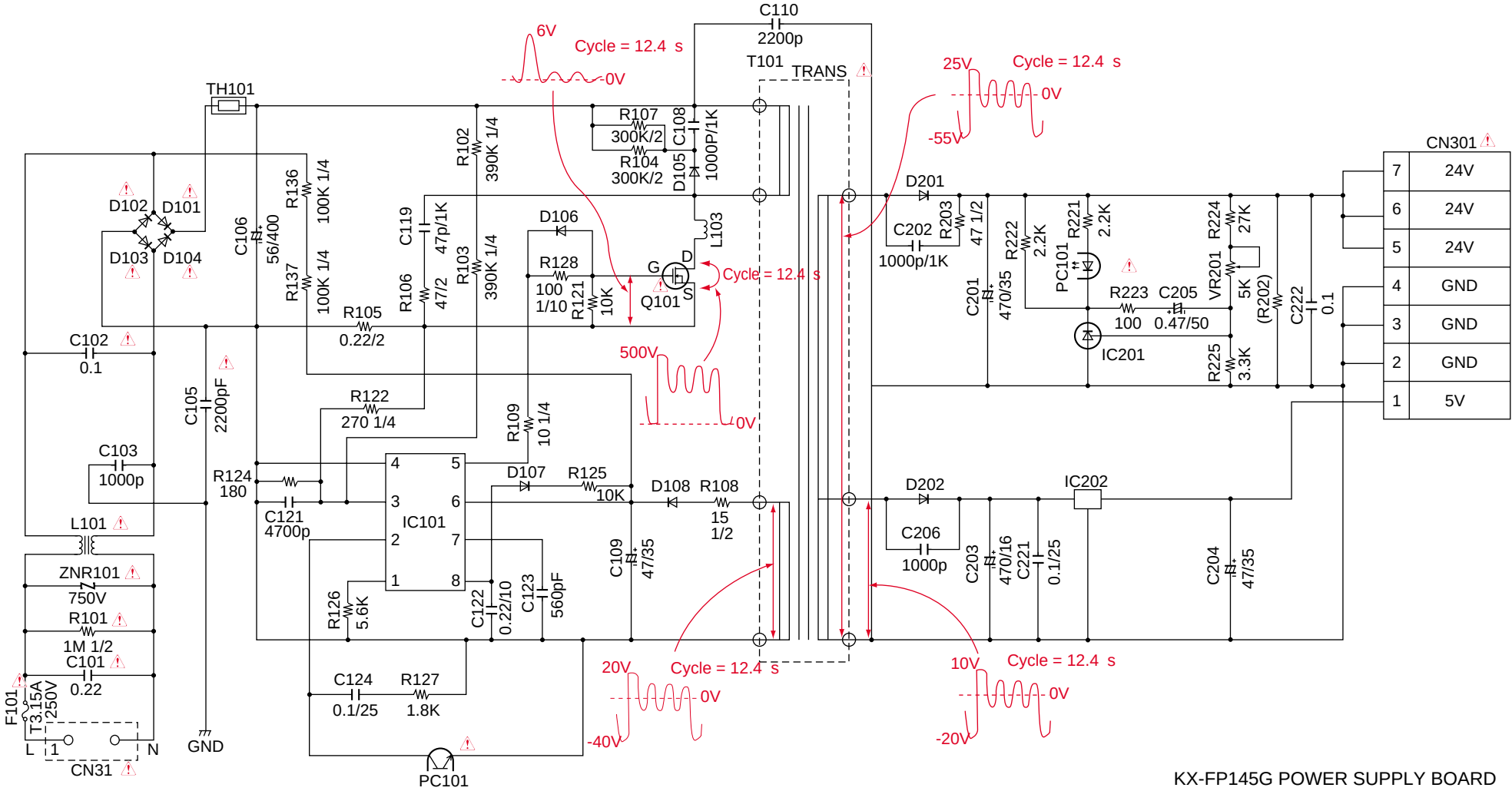
KX-FP145G ANALOG BOARD 1/2


TO LINE
IC101-2
IC101-1
IC105
IC106-2
IC106-1
Not Used
KX-FP145G ANALOG BOARD 2/2

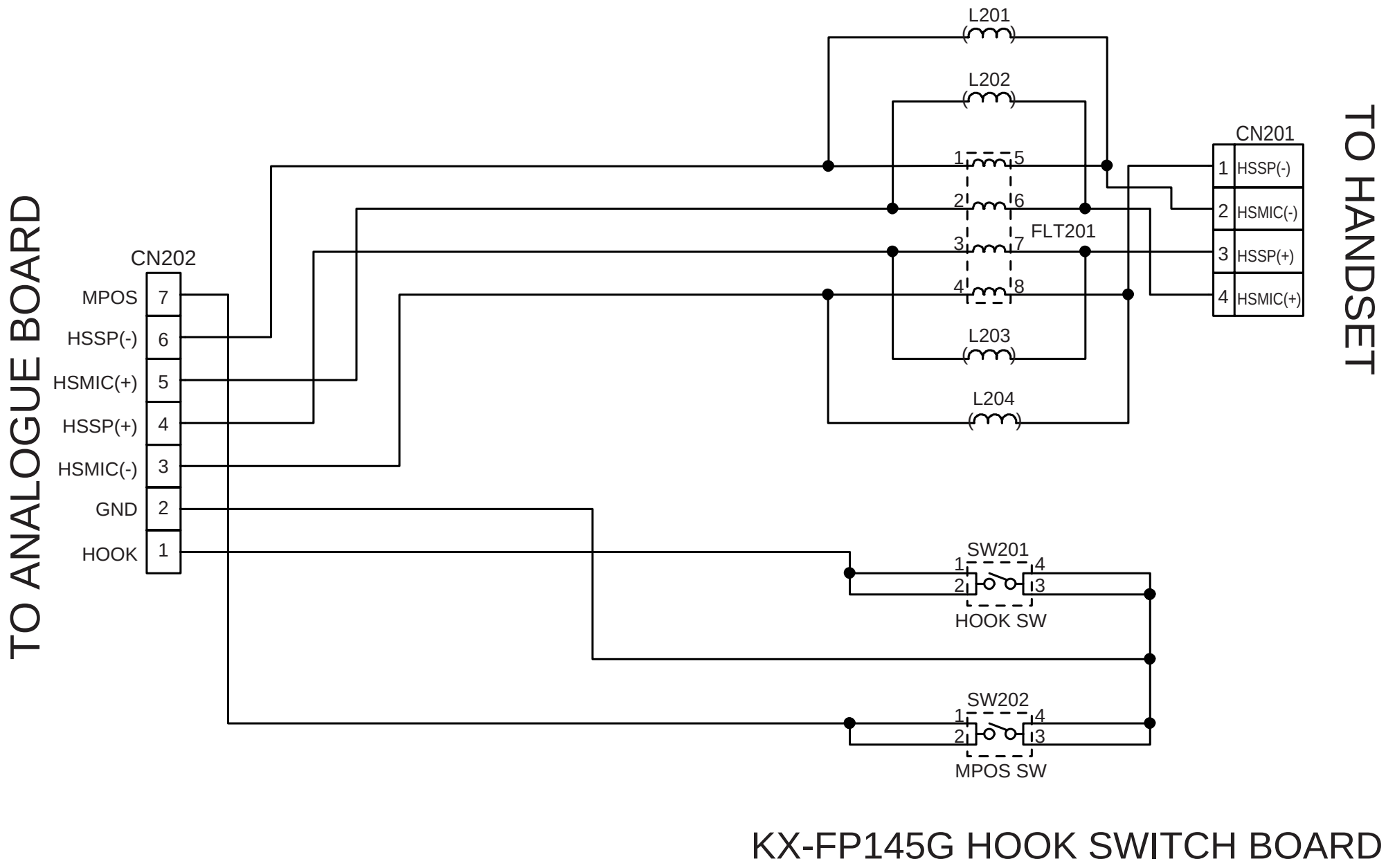


KX-FP145G ANALOG BOARD 2/2

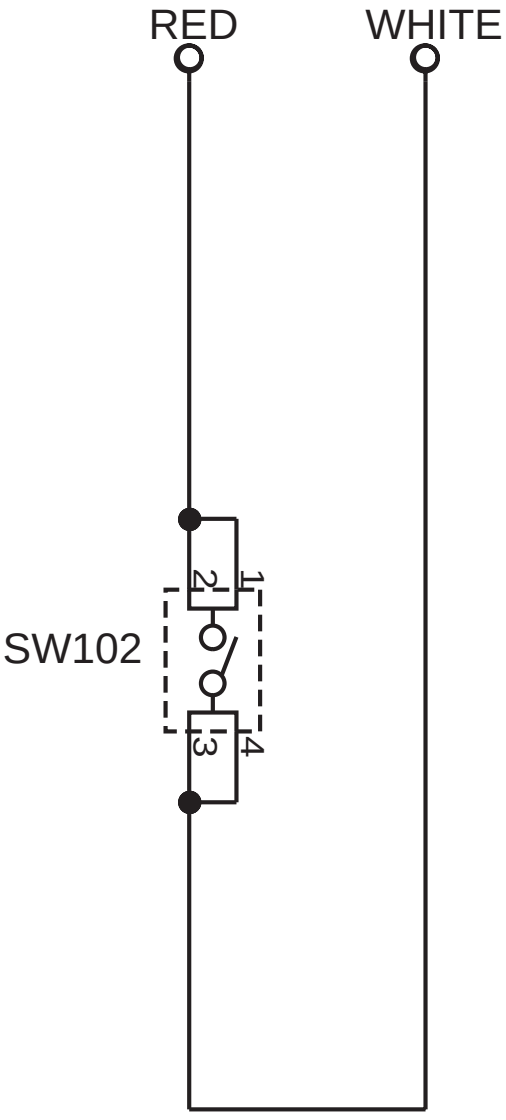

TO DIGITAL CN3301
RESET
KSCLK
KTXD
KRXD
KLATCH
KSTART
+5V
DG
AG
MICIN
3.3V
0V
RECORD SW301
ERASE SW302
(+) SW305
HELP SW309
PLAY MESSAGES SW303
→ SW306
SP-PHONE/MONITOR SW307
(-) SW310
AUTO ANSWER SW304
MENU SW308
← SW311
1 SW312
2 SW317
3 SW322
4 SW313
5 SW318
6 SW323
7 SW314
8 SW319
9 SW324
FLASH SW315
REDIAL/PAUSE SW320
MUTE SW325
* SW316
0 SW321
SW326
FAX/START SW327
CALLER-ID SW330
COPY SW328
BROAD CAST SW331
STOP SW329
IC301
CN302
GND
+5VLCD
V0
RS
R/W
E
D0
D1
D2
D3
TO COB
5V
0V
LED ON: 0V
LED OFF: 5V
NEW MESSAGES LED301
DOCUMENT SET SW
DOCUMENT TOP SW
TO MIC
MIC (+)
MIC (-)
KX-FP145G OPERATION BOARD



KX-FP145G POWER SUPPLY BOARD

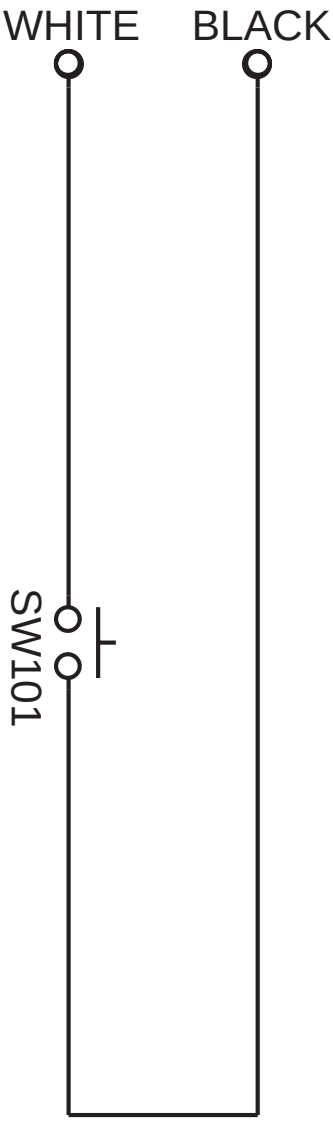

TO ANALOGUE BOARD
CN202
MPOS 7
HSSP(-) 6
HSMIC(+) 5
HSSP(+) 4
HSMIC(-) 3
GND 2
HOOK 1
L201
L202
L203
L204
FLT201
1 5
2 6
3 7
4 8
CN201
1 HSSP(-)
2 HSMIC(-)
3 HSSP(+)
4 HSMIC(+)
TO HANDSET
SW201
1 4
2 3
HOOK SW
SW202
1 4
2 3
MPOS SW
KX-FP145G HOOK SWITCH BOARD

TO DIGITAL BOARD

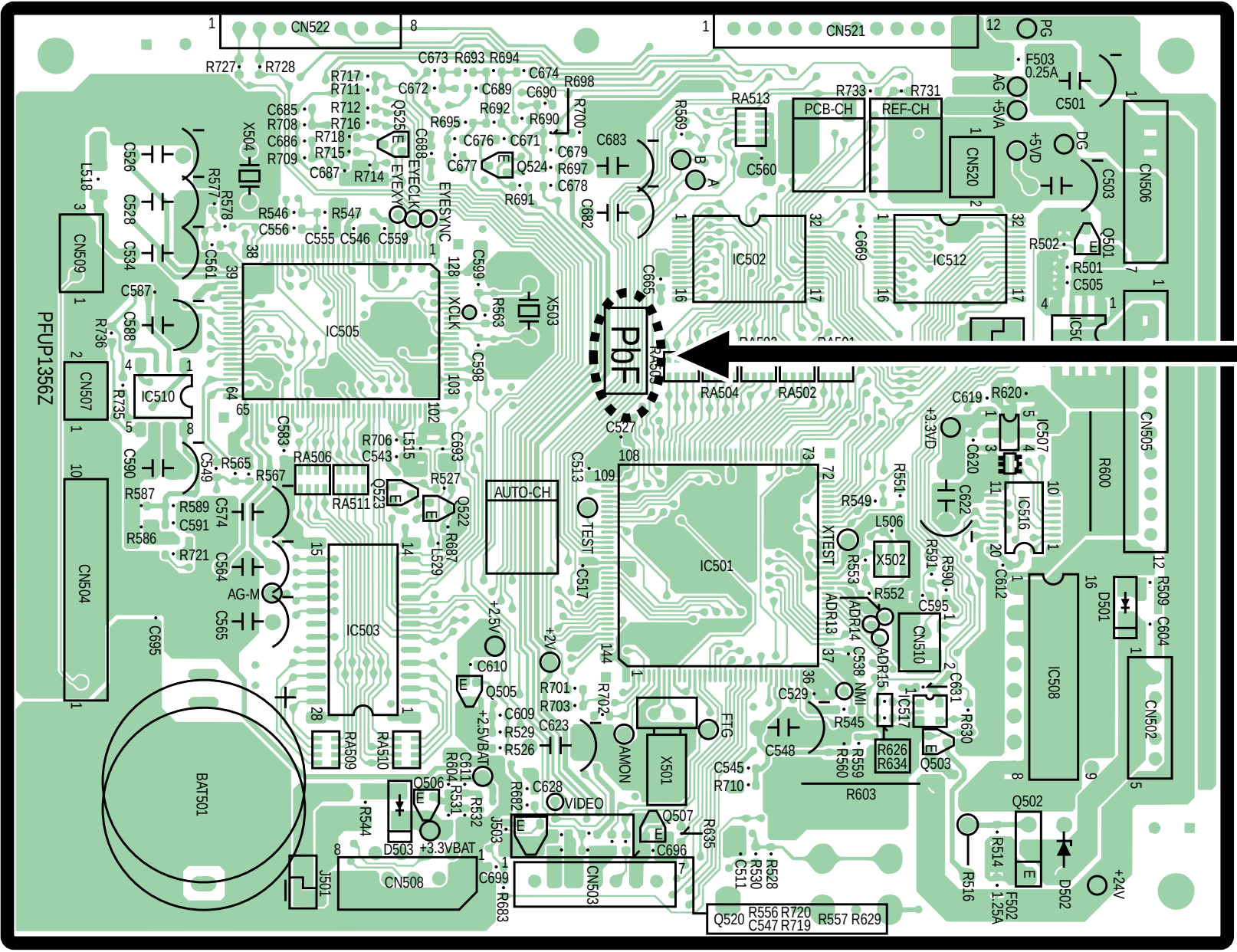


KX-FP145G
OPEN SENSOR BOARD

TO ANALOGUE BOARD

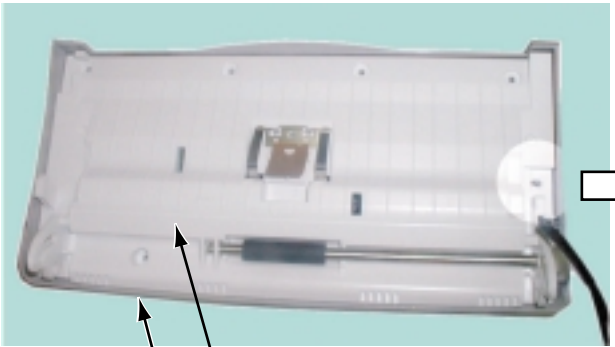


KX-FP145G REED SW BOARD



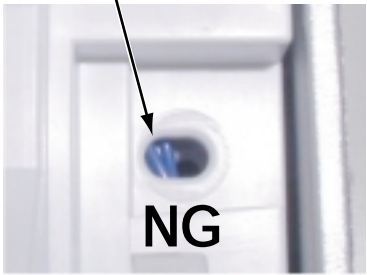
DIGITAL BOARD (COMPONENT)

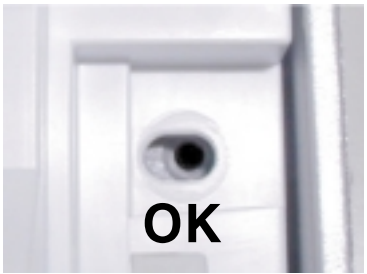
Make sure that the wire can not be seen through the screw hole when putting the operation panel cover on the operation panel.

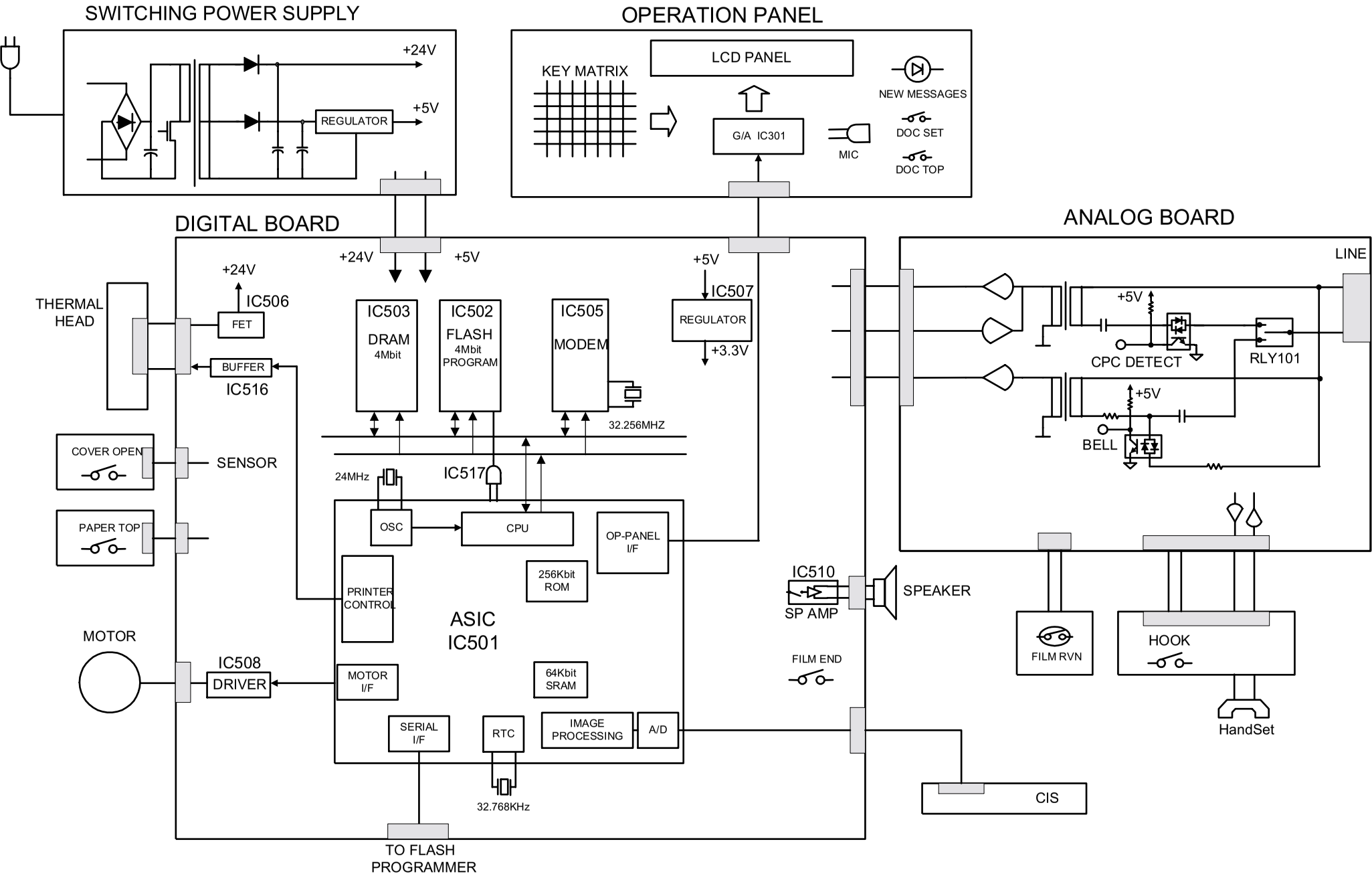


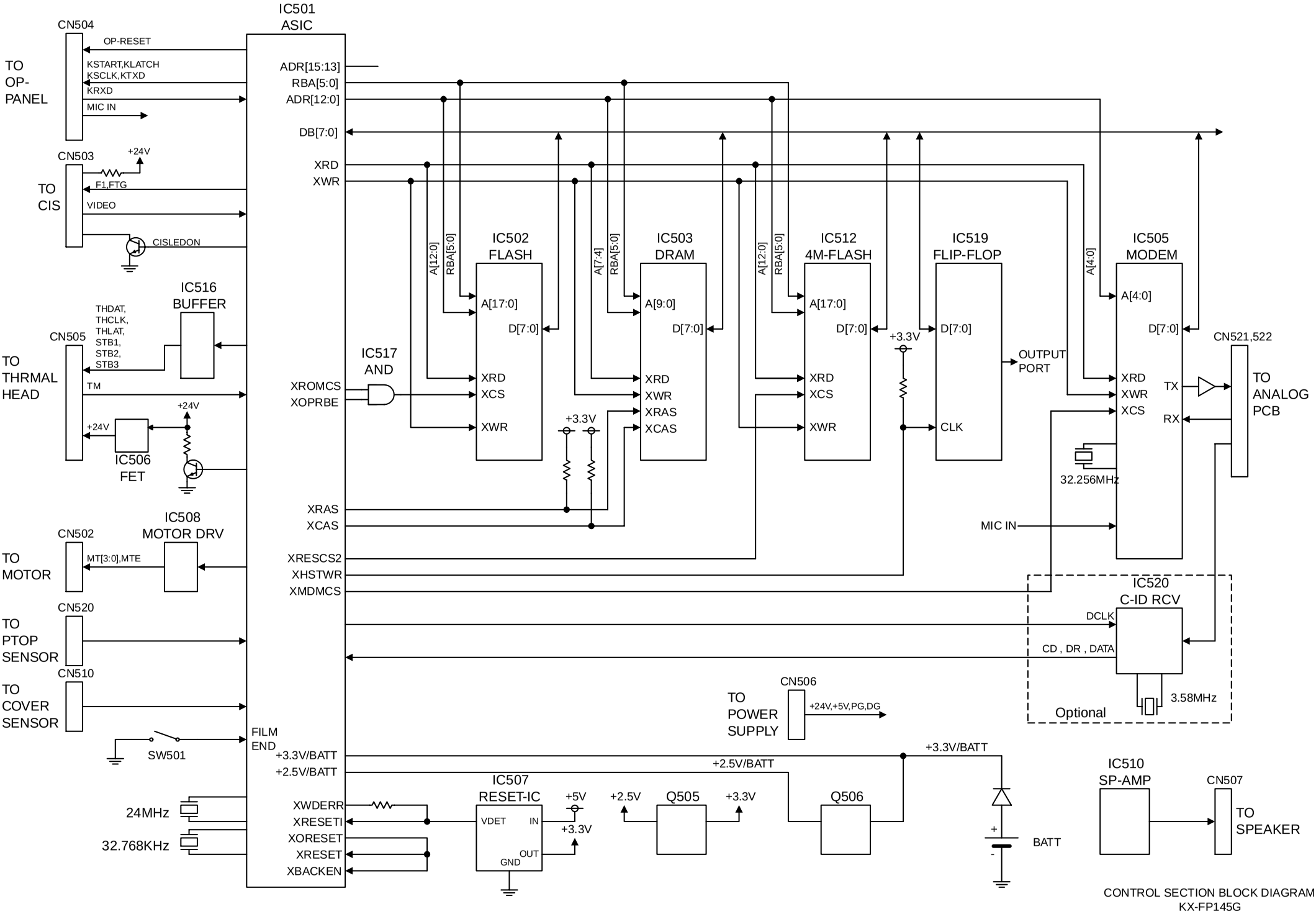
operation panel cover

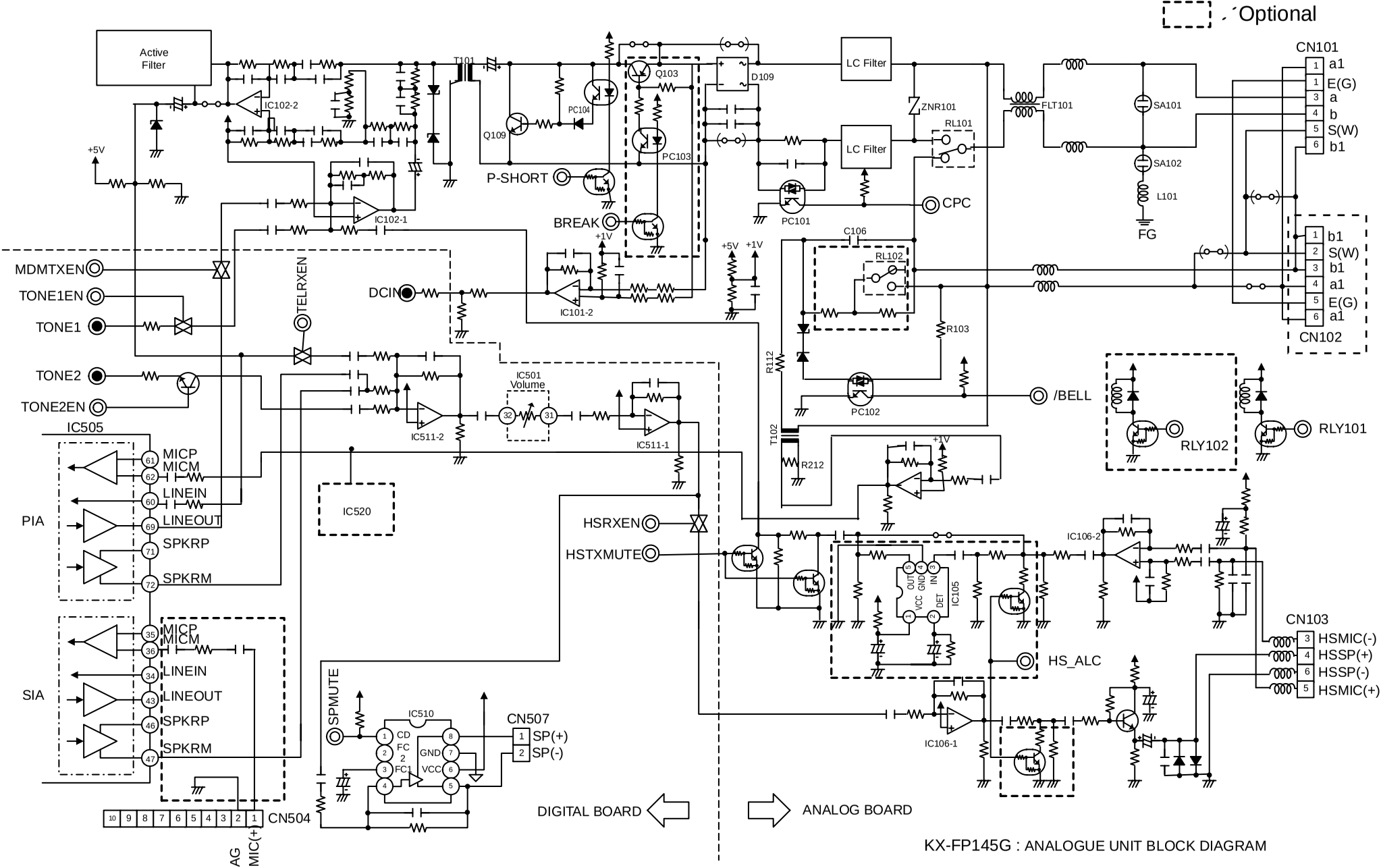
operation panel

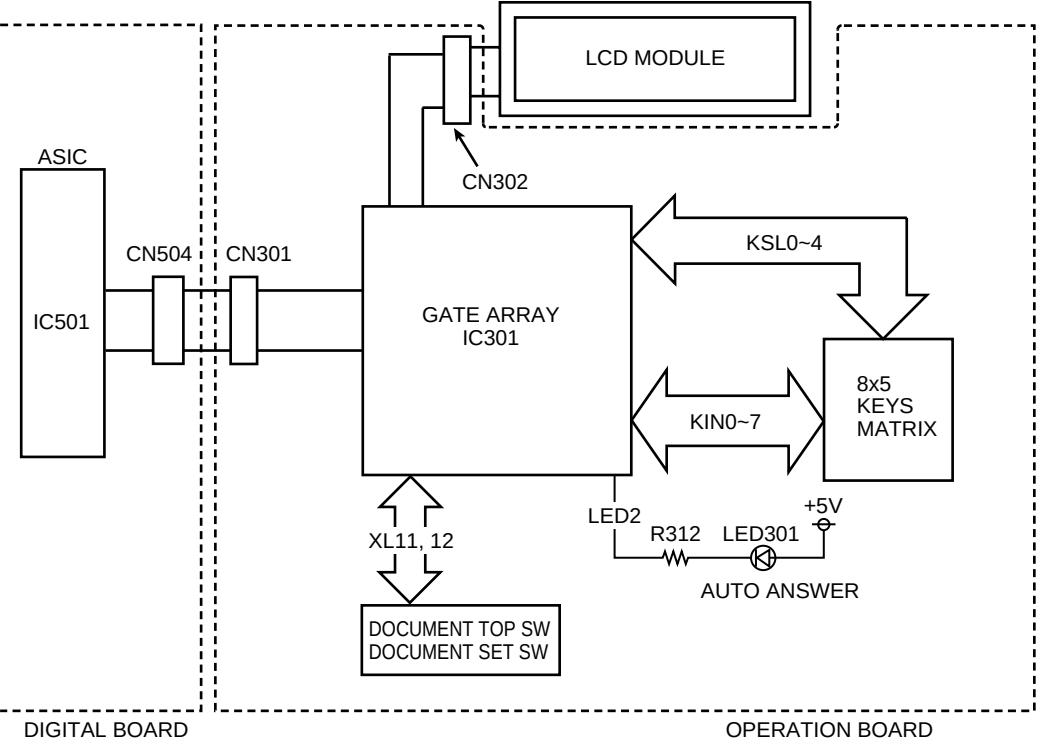





SWITCHING POWER SUPPLY
+24V
+5V
REGULATOR
OPERATION PANEL
KEY MATRIX
LCD PANEL
NEW MESSAGES
DOC SET
DOC TOP
G/A IC301
MIC
DIGITAL BOARD
ANALOG BOARD
+24V
+5V
+5V
IC507
REGULATOR
+3.3V
LINE
+24V
IC506
FET
THERMAL HEAD
BUFFER
IC516
IC503
DRAM
4Mbit
IC502
FLASH
4Mbit
PROGRAM
IC505
MODEM
32.256MHZ
+5V
CPC DETECT
RLY101
+5V
BELL
COVER OPEN
SENSOR
PAPER TOP
24MHz
IC517
OSC
CPU
OP-PANEL I/F
256Kbit ROM
PRINTER CONTROL
ASIC
IC501
IC510
SP AMP
SPEAKER
FILM RVN
HOOK
HandSet
MOTOR
IC508
DRIVER
MOTOR I/F
64Kbit SRAM
FILM END
SERIAL I/F
RTC
IMAGE PROCESSING
A/D
32.768KHz
CIS
TO FLASH PROGRAMMER


IC501
ASIC
CN504
OP-RESET
TO
OP-
PANEL
KSTART,KLATCH
KSCLK,KTXD
KRXD
MIC IN
CN503
+24V
F1,FTG
TO
CIS
VIDEO
CISLEDON
IC516
BUFFER
THDAT,
THCLK,
THLAT,
STB1,
STB2,
STB3
CN505
TO
THRMAL
HEAD
TM
+24V
+24V
IC506
FET
IC508
MOTOR DRV
CN502
TO
MOTOR
MT[3:0],MTE
CN520
TO
PTOP
SENSOR
CN510
TO
COVER
SENSOR
SW501
FILM
END
24MHz
32.768KHz
ADR[15:13]
RBA[5:0]
ADR[12:0]
DB[7:0]
XRD
XWR
XROMCS
XOPRBE
XRAS
XCAS
XRESCS2
XHSTWR
XMDMCS
+3.3V/BATT
+2.5V/BATT
XWDERR
XRESETI
XORESET
XRESET
XBACKEN
IC517
AND
IC502
FLASH
A[12:0]
RBA[5:0]
A[17:0]
D[7:0]
XRD
XCS
XWR
IC503
DRAM
A[7:4]
RBA[5:0]
A[9:0]
D[7:0]
XRD
XWR
XRAS
XCAS
+3.3V
IC512
4M-FLASH
A[12:0]
RBA[5:0]
A[17:0]
D[7:0]
XRD
XCS
XWR
+3.3V
IC519
FLIP-FLOP
D[7:0]
CLK
OUTPUT
PORT
IC505
MODEM
A[4:0]
A[4:0]
D[7:0]
XRD
XWR
XCS
TX
RX
32.256MHz
CN521,522
TO
ANALOG
PCB
MIC IN
IC520
C-ID RCV
DCLK
CD , DR , DATA
3.58MHz
Optional
CN506
TO
POWER
SUPPLY
+24V,+5V,PG,DG
IC507
RESET-IC
VDET
IN
OUT
GND
+5V
+3.3V
+2.5V
Q505
+3.3V
Q506
+3.3V/BATT
+2.5V/BATT
+
-
BATT
IC510
SP-AMP
CN507
TO
SPEAKER
CONTROL SECTION BLOCK DIAGRAM
KX-FP145G


´Optional
Active Filter
IC102-2
IC102-1
T101
Q103
Q109
PC104
PC103
D109
LC Filter
LC Filter
ZNR101
RL101
FLT101
SA101
SA102
L101
FG
CN101
1 a1
1 E(G)
3 a
4 b
5 S(W)
6 b1
CPC
PC101
P-SHORT
BREAK
+5V
+1V
C106
RL102
R103
R112
R212
T102
PC102
/BELL
RLY102
RLY101
CN102
1 b1
2 S(W)
3 b1
4 a1
5 E(G)
6 a1
MDMTXEN
TONE1EN
TONE1
TONE2
TONE2EN
TELRXEN
DCIN
IC101-2
IC501
Volume
IC511-2
IC511-1
IC505
PIA
MICP
MICM
LINEIN
LINEOUT
SPKRP
SPKRM
IC520
HSRXEN
HSTXMUTE
IC106-2
IC105
OUT
GND
IN
VCC
DET
HS_ALC
IC106-1
CN103
3 HSMIC(-)
4 HSSP(+)
6 HSSP(-)
5 HSMIC(+)
SIA
SPMUTE
IC510
CD
FC2
FC1
GND
VCC
CN507
1 SP(+)
2 SP(-)
CN504
10 9 8 7 6 5 4 3 2 1
AG
MIC(+)
DIGITAL BOARD
ANALOG BOARD
KX-FP145G : ANALOGUE UNIT BLOCK DIAGRAM


LCD MODULE
CN302
ASIC
IC501
CN504
CN301
GATE ARRAY
IC301
KSL0~4
KIN0~7
8x5
KEYS
MATRIX
LED2
+5V
R312
LED301
AUTO ANSWER
XL11, 12
DOCUMENT TOP SW
DOCUMENT SET SW
DIGITAL BOARD
OPERATION BOARD

Block Diagram